Series 1959, No. 30 Issued September 1963

SOIL SURVEY

Bath County Kentucky

OUR SOIL ★ OUR STRENGTH

UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
KENTUCKY AGRICULTURAL EXPERIMENT STATION

HOW TO USE THE SOIL SURVEY REPORT

THIS SOIL SURVEY of Bath County will serve several groups of readers. It will help farmers in planning the kind of management that will protect their soils and provide good yields; assist engineers in selecting sites for roads, buildings, ponds, and other structures; aid foresters in managing woodlands; and add to our knowledge of soil science.

Locating Soils

Use the index to map sheets at the back of this report to locate areas on the large map. The index is a small map of the county on which numbered rectangles have been drawn to show where each sheet of the large map is located. When the correct sheet of the large map has been found, it will be seen that boundaries of the soils are outlined, and that there is a symbol for each kind of soil. All areas marked with the same symbol are the same kind of soil, wherever they occur on the map. The symbol is inside the area if there is enough room; otherwise, it is outside the area and a pointer shows where the symbol belongs.

Finding Information

This report contains sections that will interest different groups of readers, as well as some sections that may be of interest to all.

Farmers and those who work with farmers can learn about the soils in the section "Descriptions of Soils" and then turn to the section "Use and Management of the Soils." In this way they first identify the soils on their farm and then learn how these soils can be managed and what yields can be expected. The "Guide to Mapping Units, Capability Units, and Woodland Suitability Groups" at the back of the report will simplify use of the map and report. This guide lists each soil and land type mapped in the county and the page where each is described. It also lists, for each soil and land type, the capability unit and woodland suitability group and the pages where each of these is described.

Foresters and others interested in woodlands can refer to the section "Woodland Management." In that section the soils in the county are grouped according to their suitability for trees, and factors affecting the management of woodland are explained.

Engineers will want to refer to the section "Engineering Characteristics of Soils." Tables in that section show characteristics of the soils that affect engineering.

Persons interested in science will find information about how the soils were formed and how they were classified in the section "Formation, Morphology, and Classification of Soils."

Students, teachers, and other users will find information about soils and their management in various parts of the report, depending on their particular interest.

Newcomers in Bath County will be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the section "General Nature of the Area," which gives additional information about the county.

* * * * *

Fieldwork for this survey was completed in 1959. Unless otherwise indicated, all statements in the report refer to conditions in the county at that time. The soil survey of Bath County was made as part of the technical assistance furnished by the Soil Conservation Service to the Bath County Soil Conservation District.

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Contents

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SOIL SURVEY OF BATH COUNTY, KENTUCKY

BY B. C. WEISENBERGER,[1] R. L. BLEVINS, AND D. M. HERSH, SOIL CONSERVATION SERVICE, UNITED STATES DEPARTMENT OF AGRICULTURE

UNITED STATES DEPARTMENT OF AGRICULTURE IN COOPERATION WITH THE KENTUCKY AGRICULTURAL EXPERIMENT STATION

BATH COUNTY, in the northeastern part of Kentucky (fig. 1), occupies a total area of 287 square miles, or 183,680 acres. The county is bounded on the north and east by the Licking River, which separates it from Fleming and Rowan Counties. It is bounded on the west by Nicholas and Montgomery Counties, and on the south, by Menifee County.

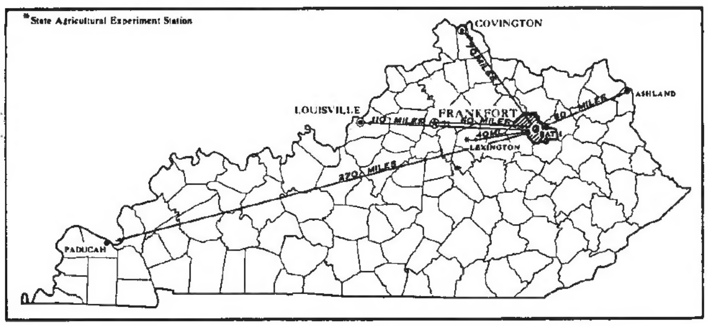

Figure 1.—**Location of Bath County in Kentucky.**

Parts of four physiographic regions are within the county (*6*).[2] These are the Mountain Region, the Knobs Region, the Outer Bluegrass Region, and the Eden Hills. These areas are described in the section "General Soil Map."

Owingsville is the county seat and largest town in this county, and other small towns are Sharpsburg, Salt Lick, and Bethel. Agriculture is the principal occupation. Corn and tobacco are the principal crops, but tobacco is by far the most important cash crop.

General Soil Map

After study of the soils in a locality and the way they are arranged, it is possible to make a general map that shows the main topographic areas in the county and several main patterns of soils, called soil associations. Such a map is the colored soil map in the back of this report. Each association, as a rule, contains a few major soils and several minor soils, in a pattern that is characteristic although not strictly uniform.

The soils within any one association are likely to differ from each other in some or in many properties; for example, slope, depth, stoniness, or natural drainage. Thus, the general soil map shows, not the kind of soil at any particular place, but patterns of soils, in each of which there are several kinds of soils.

Each soil association is named for the major soil series in it, but, as already noted, soils of other series may also be present. The major soils of one association may also be present in another association, but in a different pattern.

The soils in the different associations have different problems in use for agriculture; for example, many of the soils in one association may require artificial drainage. In contrast, protection from erosion may be the main requirement of the soils in another association.

The general map showing patterns of soils is useful to people who want a general idea of the soils, who want to compare different parts of a county, or who want to know the possible location of good-sized areas suitable for a certain kind of farming or other land use.

Soils of the Mountain Region

The southeastern part of Bath County is in the mountainous part of Kentucky. In this area the topography is rough; the uplands are deeply dissected. Only the following association is in this general area:

1. *Muskingum-Rockcastle association*

Steep to very steep, somewhat excessively drained, shallow soils of escarpments

This association consists of steep to very steep, shallow soils on the western slopes of the mountains of eastern Kentucky. The areas are in the extreme southeastern part of the county and occupy a part of the Pottsville escarpment. In this part of the county, the topography is rough. The elevation ranges from 700 to 1,300 feet, and there are a few cliffs of sandstone. The uplands are deeply dissected by narrow valleys. The ridgetops are narrow, and the side slopes are steep to very steep. This association occupies approximately 12 percent of the county.

The Muskingum and Rockcastle soils are dominant in this association. The Muskingum soils are on the ridge-

[1] E. A. OREN, woodland conservationist, and E. V. HUFFMAN, assistant State soil scientist, collaborated in writing the woodland management section.

[2] Italic numbers in parentheses refer to Literature cited, p. 124.

tops and on the upper and middle parts of the slopes (fig. 2). They are shallow and have a surface layer of stony silt loam and a subsoil of gravelly silt loam or light silty clay loam. The Muskingum soils on the ridgetops are underlain by sandstone that is highly resistant to weathering. Those on the upper and middle parts of the slopes are underlain mainly by siltstone. There are thin, discontinuous layers of limestone in places, but the limestone has had little effect on the soils.

The Rockcastle soils, on the lower parts of the slopes, are less extensive than the Muskingum soils. They have a fine-textured subsoil, are low in natural fertility, and are more easily eroded than the Muskingum soils. The Rockcastle soils are underlain by clay shale, which, like the siltstone, is more easily eroded than the sandstone.

Because of the steep slopes, little of this association is suited to crops or pasture. Nearly all of it is within the Cumberland National Forest.

Soils of the Knobs Region

In the eastern part of Bath County, isolated, rounded hills, called knobs, are numerous (fig. 3). The rocks in these knobs are more resistant to erosion than those that underlie the surrounding areas. The knobs have a conical shape. The following associations are in these areas:

2. Colyer-Rockcastle association: Moderately steep to steep, somewhat excessively drained, shallow soils of dissected uplands.
3. Johnsburg-Cavode-Rarden association: Nearly level, poorly drained to moderately well drained to well drained soils that have a fragipan and are on plains in the uplands.
4. Monongahela-Allegheny-Tyler association: Level to sloping, dominantly moderately well drained to well drained soils of old, high terraces.
5. Atkins-Pope-Stendal association: Nearly level, well-drained to poorly drained soils of first bottoms, stream terraces, and foot slopes.

2. *Colyer-Rockcastle association*

Moderately steep to steep, somewhat excessively drained, shallow soils of dissected uplands

This association consists of highly dissected areas that border the mountains. Throughout the association are conical knobs. Near the mountains the knobs have flat tops and are higher and more numerous than the knobs farther from the mountains. The soils of this association are underlain by soft clay shale or by brittle, black fissile shale. In all of the areas, slopes are steep, runoff is rapid, and the soils are subject to severe erosion. The association occupies about 9 percent of the county.

The Colyer and Rockcastle soils are dominant in this association. The Colyer soils are very shallow and formed in material weathered from black fissile shale. They have a thin surface layer of grayish-brown to light yellowish-brown shaly silt loam. Their B horizon of strong-brown silty clay loam is thin and discontinuous.

The Rockcastle soils, in areas above the Colyer soils, formed in material weathered from acid, gray clay

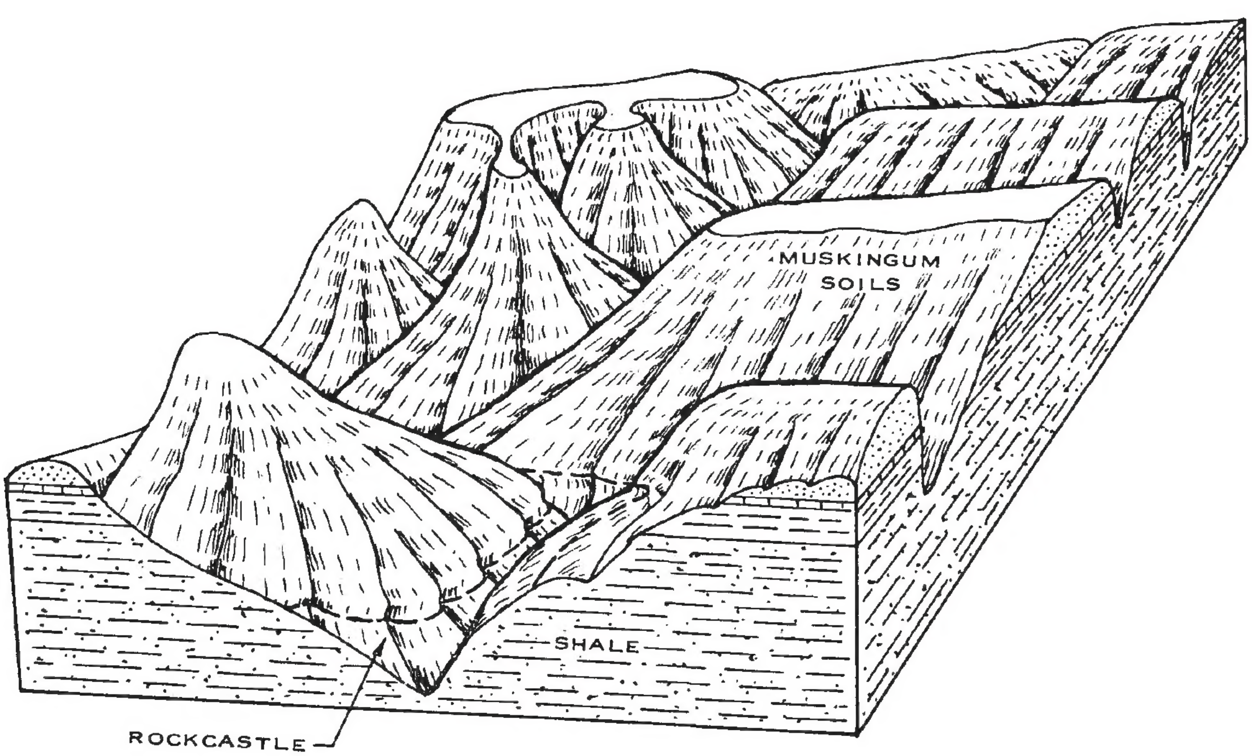

Figure 2.—Typical landscape in the mountainous southeastern part of the county showing the topography and the relative position of the Muskingum soils in association 1.

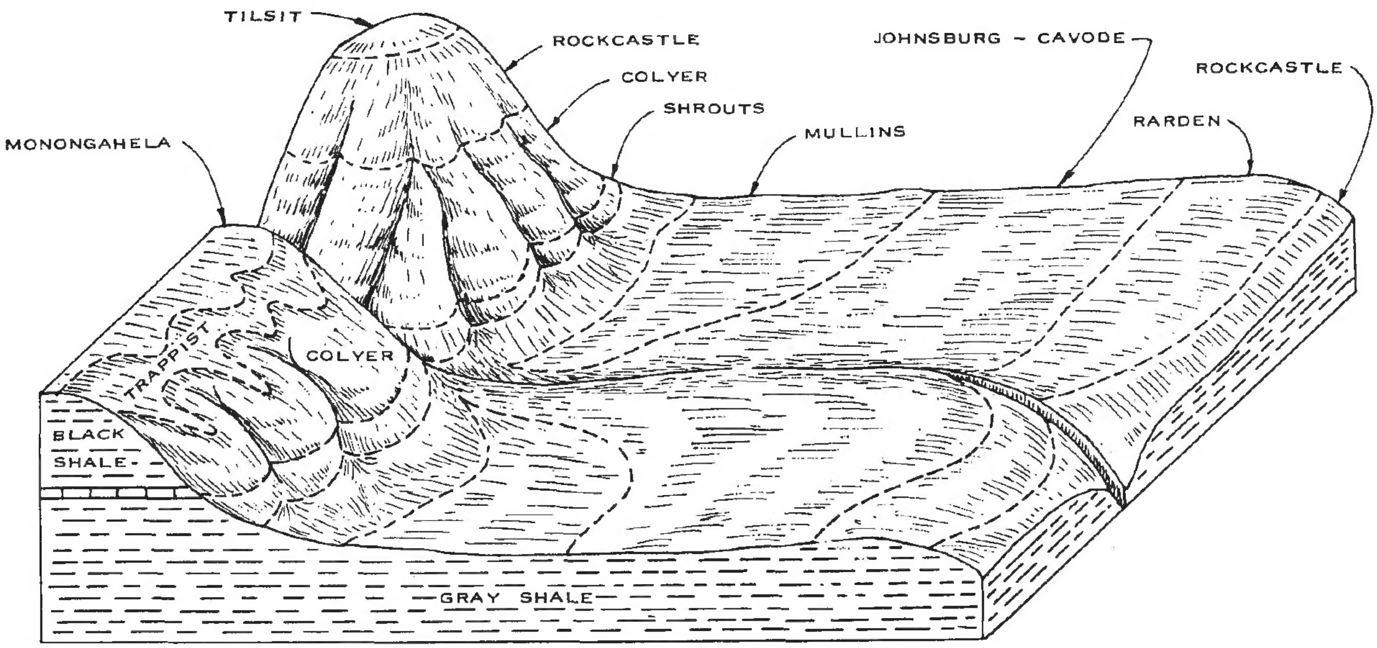

Figure 3.—**Typical landscape in the knobby areas of the county showing the topography, the relationship of some of the principal soils, and the parent rocks.**

shale. The Rockcastle soils are grayer and are slightly deeper than the Colyer soils, and they are much finer textured and less shaly.

The soils in this association are low in natural fertility and are easily eroded. They are somewhat droughty and are better suited to trees than to field crops or pasture. Nevertheless, a small acreage is pastured, and a few other areas that are less steep have limited potential for pasture. Much of the association is within the Cumberland National Forest, but nearly half of the acreage is in farms that are privately owned. Most of the farms are less than 80 acres in size and are owned and operated by part-time farmers. A few of the larger tracts are owned by farmers who do not operate their farms.

3. *Johnsburg-Cavode-Rarden association*

Nearly level, poorly drained to moderately well drained soils that have a fragipan and are on plains in the uplands

This association consists mainly of nearly level, poorly drained to moderately well drained soils that have a fragipan. The soils are chiefly on plains in the uplands. Some areas, however, are in old valleys underlain by shale, along the western border of the area of highest conical knobs. The soils in this association are underlain by soft, olive or gray and black fissile shale. They are acid and low in fertility. In many of the poorly drained areas, a fragipan in the lower part of the subsoil hinders artificial drainage. This association occupies about 4 percent of the county.

The Johnsburg and Cavode soils, mapped as undifferentiated units, are the dominant soils in this association. The Johnsburg soils are much more extensive—the Cavode soils occupy only about 15 percent of the acreage in the Johnsburg and Cavode mapping units. Less extensive are the Rarden soils; a still smaller acreage is occupied by the Mullins, Trappist, Tilsit, Monongahela, and Purdy soils. In the areas that are nearly level, the Johnsburg and Cavode soils are somewhat poorly drained, but, in some of the rolling areas, they are moderately well drained. The Johnsburg soils have a fragipan at a depth of about 18 inches. The Cavode soils lack a fragipan or have only a weak fragipan, but they have a subsoil of mottled silty clay or clay.

The Rarden soils are well drained to moderately well drained. In most areas of the Rarden soils, the slope is steeper than the slope of the Johnsburg and Cavode soils. The Rarden soils have a subsoil of heavy clay that is redder than the subsoil in the Johnsburg and Cavode soils and is not gleyed.

The Mullins soil occupies only small areas in this association. It is poorly drained and is more nearly level than the other soils. The Mullins soil has a fragipan.

Of the other soils included in this association, the Trappist soils are well drained; the Tilsit and Monongahela, moderately well drained; and the Purdy soils, poorly drained. The Purdy soils have a fragipan. The Trappist soils formed in material weathered from black fissile shale, and the Tilsit soils, in material weathered from interbedded shale, siltstone, and sandstone. The Monongahela and Purdy soils formed in old river alluvium on river terraces or in local alluvium washed from soils of the steep knobs.

Most of the soils in this association are better suited to pasture than to cultivated crops. Pastures are fairly good in the areas that have been drained if ground limestone and fertilizer have been added and suitable grasses seeded. The soils are used to a limited extent for row crops. The main cash crop is tobacco, which is grown on the better drained soils.

The farms in this association are mainly about 50 acres in size. Much of the farming is done on a part-time basis.

4. *Monongahela-Allegheny-Tyler association*

Level to sloping, dominantly moderately well drained to well drained soils of old, high terraces

This association consists of level to sloping, moderately well drained to well drained soils on old, high stream terraces. The areas are north of U.S. Highway No. 60 and are parallel to the Licking River. The dominant soils in the association—the Monongahela, Allegheny, and Tyler—formed in old alluvium. They are on high stream terraces, above areas of soils formed in residuum, and at an elevation considerably above the soils in valleys of the present day. The association occupies approximately 4 percent of the county.

The Monongahela, Allegheny, and Tyler soils of this county are easily identified by the many small, rounded, quartz pebbles on the surface and in the soil profile. The parent material is of the Irvine formation of the Tertiary geologic period.

Monongahela soils are dominant in the southern part of this association (fig. 4), and Allegheny soils are dominant in the northern part. The Tyler soils are also extensive, but they are less extensive than the Monongahela and Allegheny soils. The Purdy soil also occupies small areas in the association.

The Monongahela soils are deep and are nearly level to sloping. They are moderately well drained and have a fragipan. The nearly level areas of Monongahela soils are associated with the Tyler soils, which are somewhat poorly drained, and with the Purdy soil, which is poorly drained. The Monongahela, Tyler, and Purdy soils are all moderately low in fertility. The Tyler and Purdy soils have a fragipan.

The Allegheny soils, like the Monongahela, are deep. They are well drained and have a browner surface layer and subsoil than the other soils in the association. The Allegheny soils are moderately fertile and are the most productive of any of the soils in the association.

The soils in this association are suitable for pasture. They are suitable for most of the cultivated crops grown in the county if drainage has been provided, where needed, and lime and fertilizer have been applied. In areas where surface drainage has been carefully controlled and lime and fertilizer have been added, good crops of tobacco, corn, and forage crops are produced. A few small, sandy and droughty areas are idle or are in timber.

The farms in this association are mainly about 100 acres in size. Some are operated by the owners, and others, by tenants.

5. *Atkins-Pope-Stendal association*

Nearly level, well-drained to poorly drained soils on first bottoms, stream terraces, and foot slopes

This association consists of nearly level soils on first bottoms, stream terraces, and foot slopes. The areas are in the eastern part of the county, along Mill Creek, Mud Lick Creek, Salt Lick Creek, and the Licking River and its tributaries. Some of the areas are narrow, but others are as much as 1½ miles wide (fig. 5). The association occupies about 12 percent of the county.

The soils in this association formed mainly in alluvium derived from sandstone, shale, and siltstone. They are

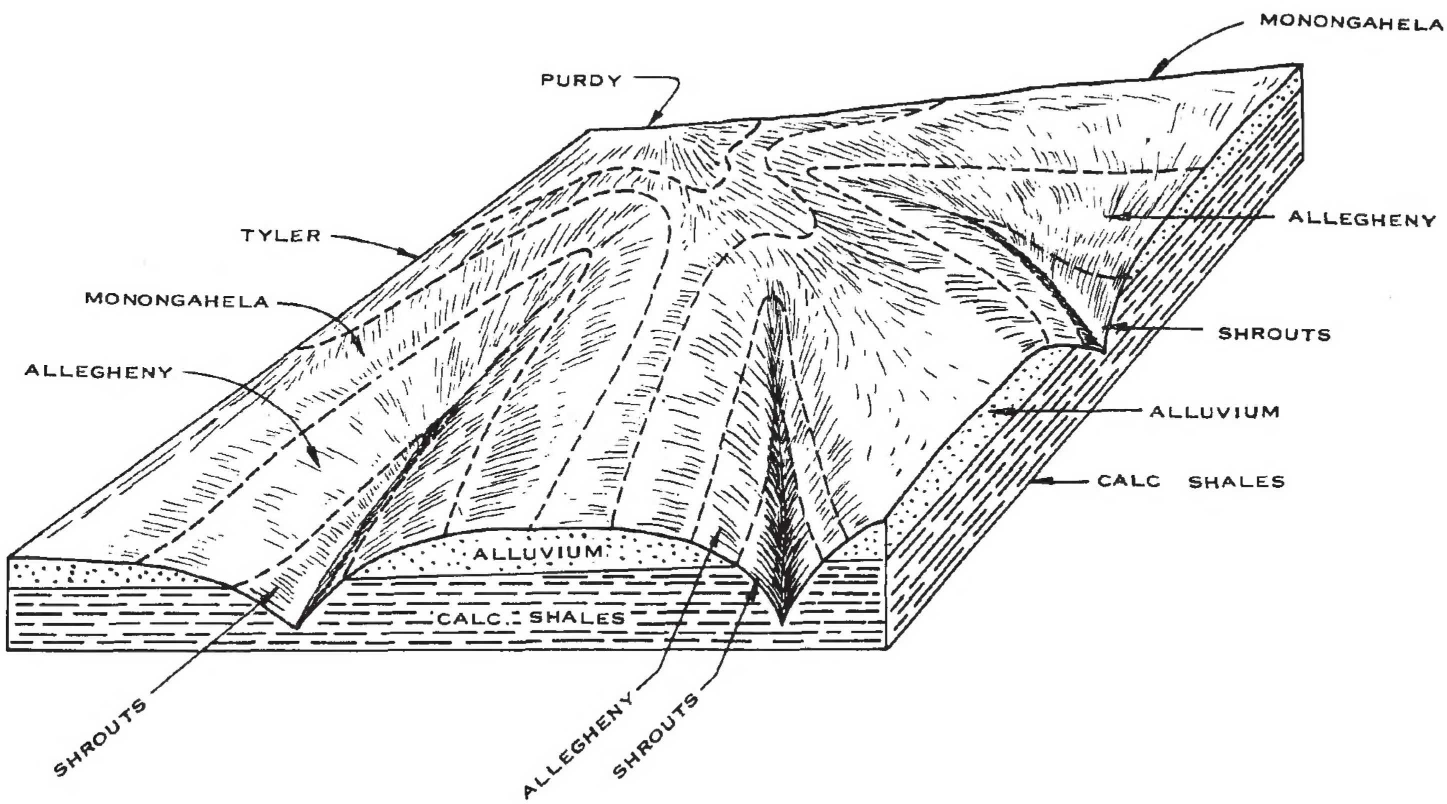

Figure 4.—**Typical landscape in the southern part of association 4 showing the topography, the relationship of the principal soils, and the parent rocks.**

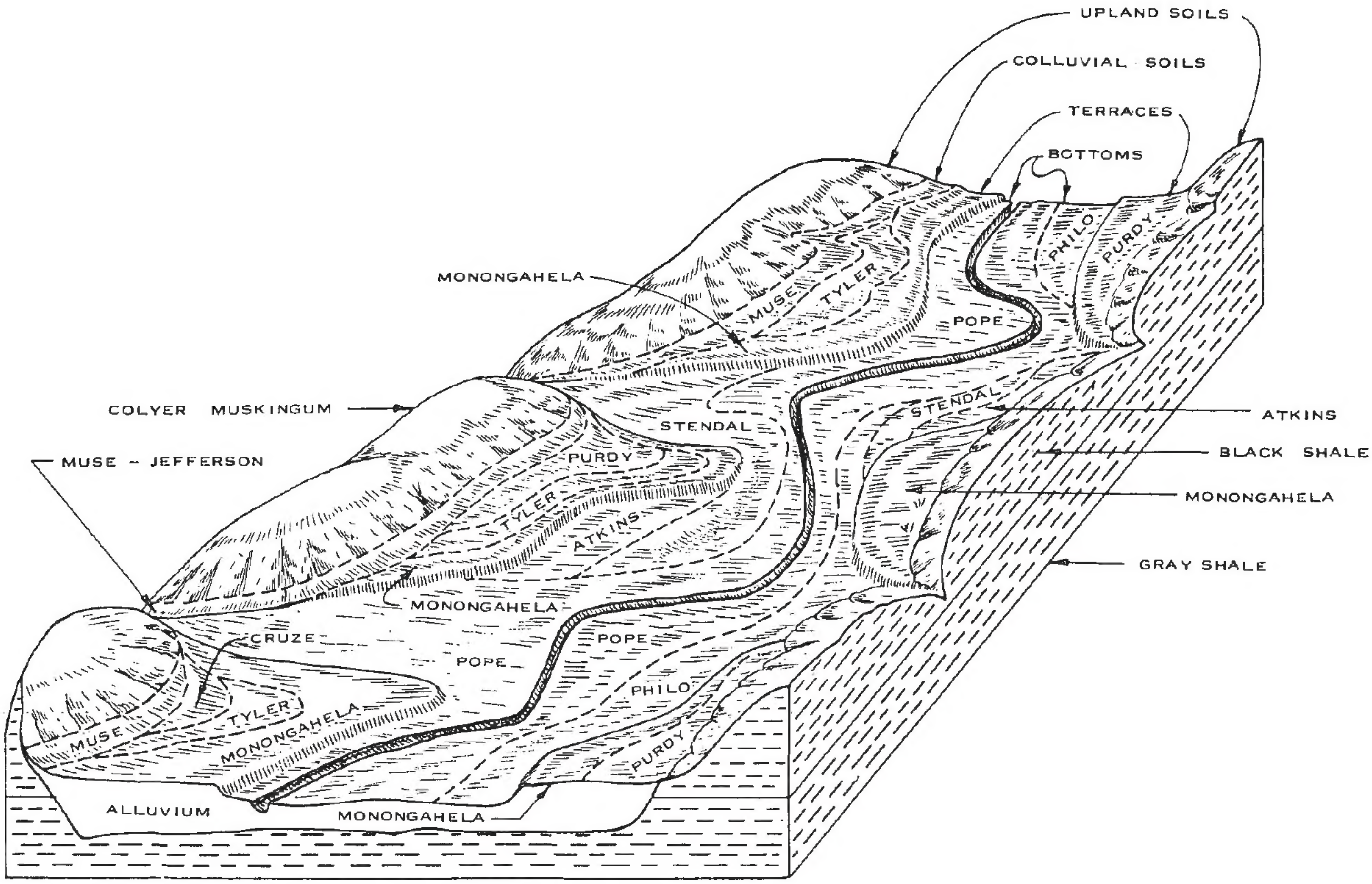

***Figure 5.*—Typical landscape in a river valley and the relative position of the principal soils.**

less fertile than the soils formed in alluvium derived from limestone. Drainage is poor in many of the areas. The soils on first bottoms are flooded occasionally, but the floods do not last long. In the areas along Mill Creek, Mud Lick Creek, and parts of Salt Lick Creek, the soils are fine textured because of the influence of shale.

The Atkins, Pope, and Stendal soils, on first bottoms, are dominant in this association, but the Philo soils are also important. Minor soils are the Sequatchie, Whitwell, Monongahela, Tyler, Purdy, Blago, Muse, Cruze, and Jefferson. The soils of the Atkins, Pope, and Stendal series are about equal in extent, and the Philo soils occupy an acreage about one-third as large as the acreage of the soils in each of these series. The Pope soils are well drained, the Philo, moderately well drained, the Stendal, somewhat poorly drained, and the Atkins, poorly drained. Typically, the Pope soils are nearest the stream, and the Atkins soils, in depressions farthest from the stream. The texture of the subsoil ranges from sandy loam in the typical Pope soils to silty clay in the Atkins soils.

The Sequatchie and Whitwell soils are on low terraces along the Licking River near the town of Salt Lick. The Sequatchie soils are well drained, and the Whitwell soils are moderately well drained to somewhat poorly drained. These soils are somewhat higher in natural fertility than the soils on the higher stream terraces, but none of the soils in terrace areas are as high in natural fertility as the soils on first bottoms.

The acreage of soils on the higher stream terraces, or second bottoms, is about equally divided among the moderately well drained Monongahela soils, the somewhat poorly drained Tyler soils, and the poorly drained Purdy soils, but a small acreage of Blago soils is included. The soils on the higher stream terraces lie above the present flood plains of Salt Lick Creek and the Licking River. The Monongahela, Tyler, and Purdy soils differ primarily in drainage, but all of these soils have a fragipan. The Blago soils, along Salt Lick Creek, are dark colored and are high in organic matter. They do not have a fragipan.

The soils on foot slopes are along Mill Creek, Mud Lick Creek, Salt Lick Creek, and the Licking River and its tributaries. They are at a higher elevation than the soils on stream terraces and first bottoms. The dominant soils on foot slopes are the well-drained Muse soils, formed in local alluvium derived mainly from black fissile shale. Other soils on foot slopes are the moderately well drained Cruze soils, formed in colluvium from black fissile shale, and the well-drained Jefferson soils, formed in a mixture of colluvium and local alluvium derived from sandstone and shale. The Muse and Cruze soils are darker colored, finer textured, and less gravelly than the Jefferson soils.

The soils in this association are all naturally acid, and many of the areas are poorly drained. The soils of terraces are difficult to drain properly because of the fragipan. Tiling is not feasible in many of the areas on first bottoms because proper outlets are lacking or drainage is hindered by the slow permeability of the subsoil. Nevertheless, much corn is grown on the soils of this association, especially on the first bottoms. In many places good pasture and hay are produced. Tobacco is grown mainly on the foot slopes or on terraces above the present flood plains. Some of the wet, undrained areas are in woods or are idle.

The farms in this association range from 50 to 300 acres in size. They are operated partly by tenants and partly by owners; many operators are part-time farmers.

Soils of the Outer Bluegrass Region

In the northwestern and central parts of the county is an area of upland plains called the Outer Bluegrass. This area is along the edge of the old Lexington peneplain. It is underlain mainly by limestone of Ordovician age, but partly by limestone of Devonian age. The following associations are in this general area:

6. Hagerstown-Fleming-Bedford association: Level to sloping, deep to moderately deep, dominantly well drained soils of upland ridges.
7. Fairmount-Otway association: Steep, shallow, well-drained to excessively drained soils that have a dark-colored surface layer high in calcium and are on highly dissected uplands.
8. Lowell-Shelbyville association: Undulating to rolling, deep, well-drained soils of uplands.
9. Huntington-Egam-Captina association: Chiefly nearly level, deep, well drained to moderately well drained soils of narrow first bottoms, stream terraces, and foot slopes.

6. *Hagerstown-Fleming-Bedford association*

Level to sloping, deep to moderately deep, dominantly well drained soils of upland ridges

This association consists of level to sloping, deep to moderately deep soils of the upland plains. The areas are in the southwestern part of the county and extend from Owingsville southwestward to Montgomery County. The association occupies approximately 4 percent of the county.

The major soils in this association are the Hagerstown and Fleming, which are well drained, and the Bedford, which are moderately well drained. Minor soils are the somewhat poorly drained Lawrence and poorly drained Guthrie soils. The Bedford, Guthrie, and Lawrence soils all have a fragipan.

The Hagerstown soils are on broad flats in the uplands. They lie above the Fleming soils, which are on side slopes (fig. 6). The Fleming soils are fairly extensive and form a band around the outer edge of the association. The upper part of the solum in the Fleming soils formed in material weathered from limestone, and the lower part, in material weathered from clay shale.

The soils of this association are high or fairly high in natural fertility and are good for agriculture. The Hagerstown soils are especially well suited to agriculture because they are high in natural fertility and are very productive. Some of the soils need drainage. Because the fragipan is near the surface in many places, however, tiling is not feasible and open ditches are used. In places chert or flint is likely to damage farm machinery.

The farms in this association are fairly large—commonly more than 120 acres in size. They are operated mainly by the owners, but some are operated by tenants. Good yields of tobacco are obtained on the well drained or moderately well drained soils, and good pasture on the somewhat poorly drained or poorly drained areas.

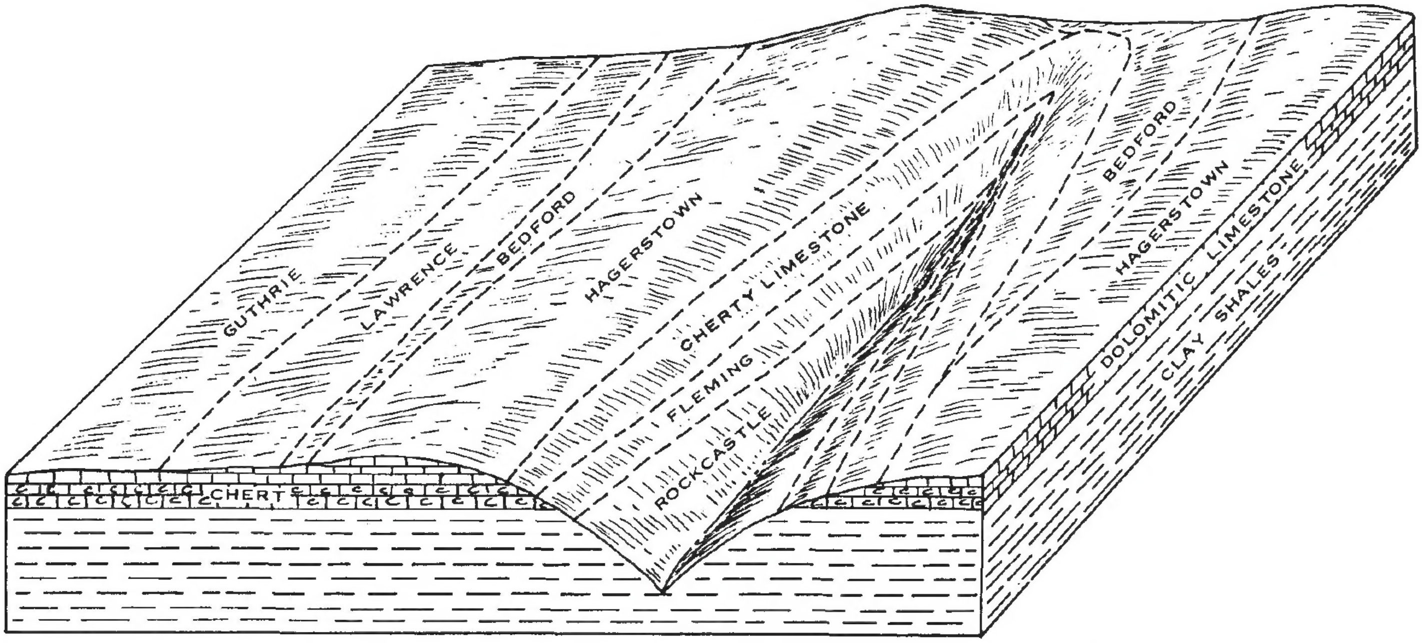

***Figure 6.*—Typical landscape showing the topography and the relative position of the principal soils in association 6 and the parent rocks from which the soils formed.**

7. *Fairmount-Otway association*

Steep, shallow, well-drained to excessively drained soils that have a dark-colored surface layer high in calcium and are on highly dissected uplands

This association consists of highly dissected areas (fig. 7) that extend from a point south of Owingsville northward through the central part of the county toward the Licking River. The areas are severely eroded. The erosion was caused when early settlers raised large flocks of turkeys that overgrazed the land. The soils are underlain by calcareous shale, locally called marl, and by thin-bedded, argillaceous limestone. This association occupies approximately 27 percent of the county.

The dominant soils in this association are the Fairmount and Otway, but a smaller acreage of Lowell and Beasley soils is included. The Fairmount and Otway soils are shallow and have a surface layer of dark-colored silty clay loam or silty clay. The Fairmount soils lie below the areas of Otway soils. They are flaggy and formed in material weathered from limestone. The Otway soils are free of stones and formed in material weathered from soft, calcareous shale.

Near the Fairmount soils is a moderately large acreage of shallow Lowell soils. The Lowell soils are less flaggy than the Fairmount soils and have a thicker, more brightly colored B horizon. On the broader ridgetops near the Otway soils, there is also a small acreage of Beasley soils. The Beasley soils have a lighter colored, coarser textured surface layer than the Otway soils and a thicker, somewhat redder and better developed B horizon.

The use of farm machinery is difficult on the soils of this association because of the steep slope, fine texture of the subsoil, and the presence of thin slabs of limestone on the surface and in the soil profile. Runoff is rapid. The Fairmount and Otway soils are droughty. They are neutral to alkaline and do not need lime.

If grazing is controlled, the Fairmount and Otway soils are better used for pasture than for tilled crops or trees; trees, other than redcedar, do not grow well because of the fine texture of these soils. The soils are well suited to bluegrass, but forage crops that resist drought are better to grow. Areas of the Beasley and Lowell soils that are not eroded can be used for cultivated crops, but the acreage of these soils that is not eroded is limited.

Much of this association is covered by scrub trees and brush. In the main, cultivated crops are not grown, except on the bottom lands and on uneroded areas of Beasley and Lowell soils.

The average size of farms in this association is about 90 acres. Most of the farms are operated by the owner.

8. *Lowell-Shelbyville association*

Undulating to rolling, deep, well-drained soils of uplands

This association consists of undulating to rolling soils (fig. 8) in the western part of the county near the towns of Sharpsburg and Bethel. The soils are deep and are underlain by limestone, calcareous shale, sandstone, and siltstone. The association occupies approximately 16 percent of the county.

The dominant soils in this association are the Lowell and Shelbyville, but a smaller acreage is occupied by the Nicholson soils. The Lowell soils are on narrow ridges and on side slopes, and the Shelbyville soils are on broader ridges. The Lowell soils are well drained. Their surface

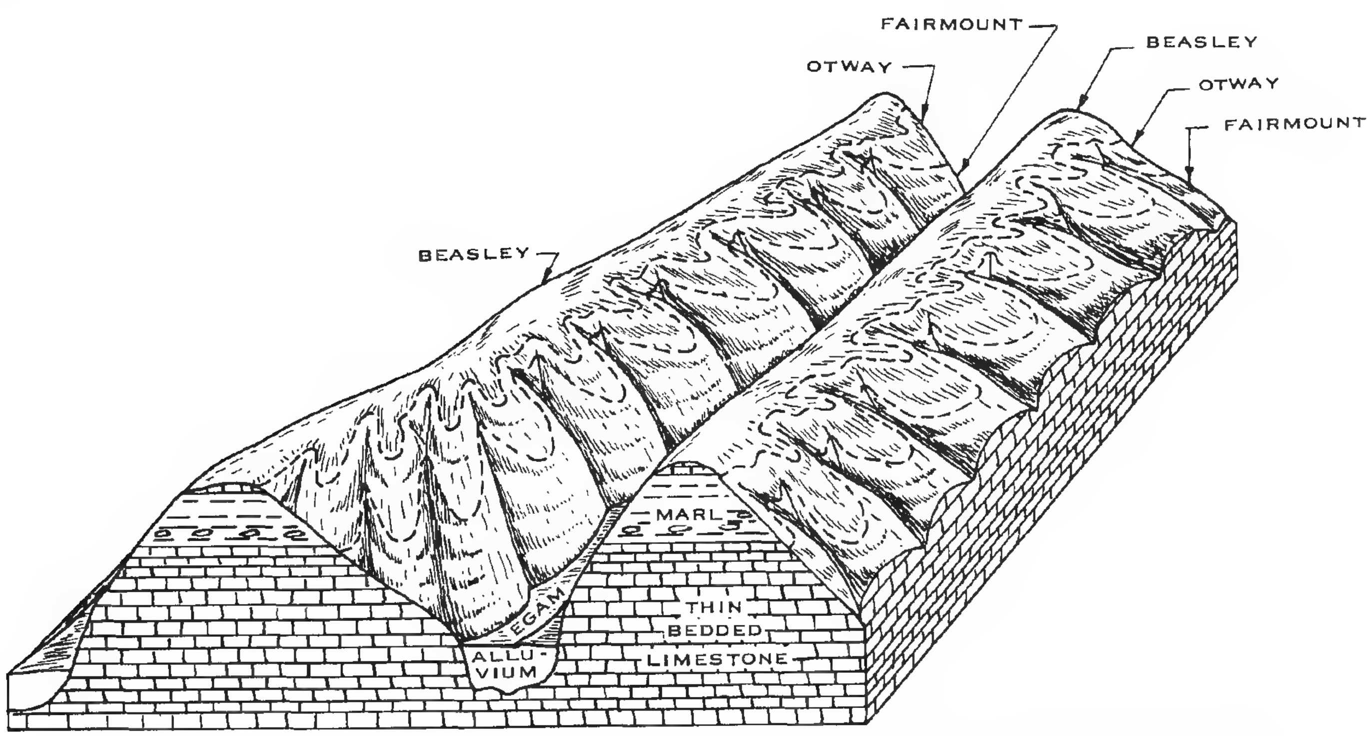

Figure 7.—Typical landscape showing the topography and relative position of the principal soils in association 7.

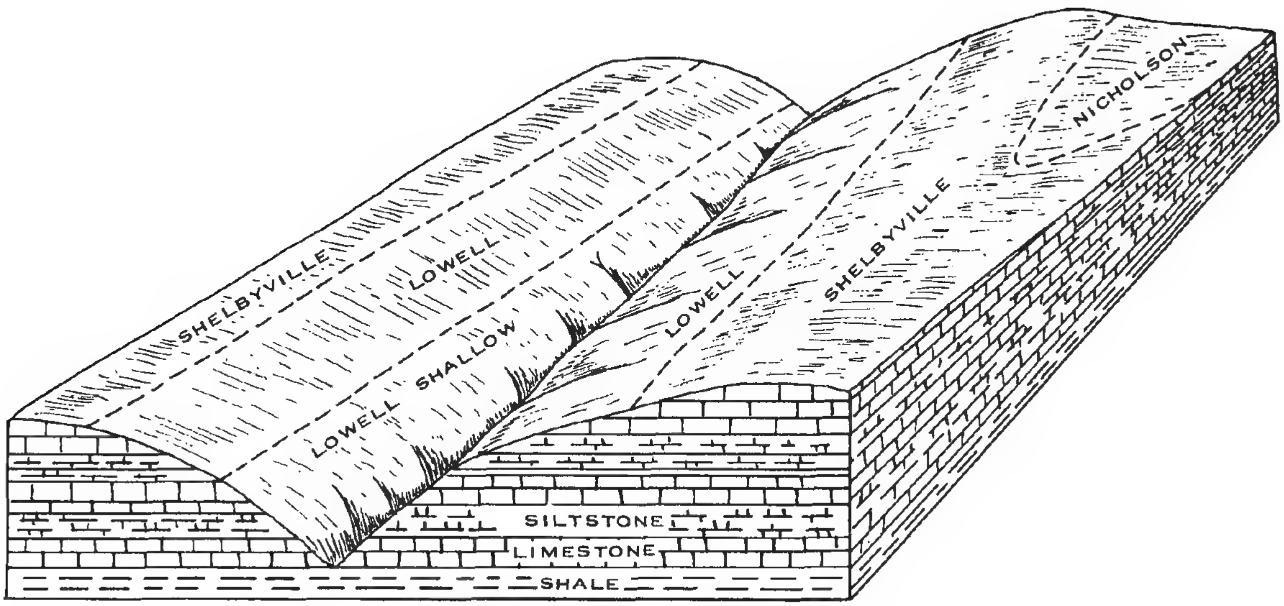

Figure 8.—**Typical landscape showing the topography and relative position of the principal soils in association 8.**

layer is dark brown or dark grayish brown and overlies a yellowish-brown subsoil. In most of the areas, the lower part of the subsoil is fine textured (silty clay or clay). On the steep slopes, however, there are shallow Lowell soils, which have a subsoil that is fine textured throughout.

The Shelbyville soils occupy a smaller acreage than the Lowell soils. They have a surface layer of dark-brown silt loam and a subsoil of dark-brown or strong-brown silty clay loam. The Shelbyville soils have a coarser textured, more friable subsoil than the Lowell soils. Also, in the lower part of the subsoil, they have distinctive, rather firm, mottled layers that contain a large amount of dark-colored concretionary material.

The Nicholson soils are not extensive in this association. They are on broad ridges near the Shelbyville soils. The Nicholson soils resemble the Shelbyville soils, but they have a fragipan rather than concretionary layers. Typically, they are also lighter colored and more acid than the Shelbyville soils. In a large area of Nicholson soils near Sharpsburg, however, the surface layer is thicker, darker colored, and less acid than that in the typical Nicholson soils. The differences in the surface layer in this particular area were brought about by the Indians who used the site for a camp.

The soils of association 8 are high in natural fertility and are well suited to general farming. Drainage is not a problem, and farm machinery is easy to use in most areas. The soils erode easily, but erosion can be controlled.

The soils of this association have long been important for growing high-quality burley tobacco. Tobacco is the main cash crop grown on the association, but corn is also grown, mainly for use on the farm. Much of the association is now used to produce good-quality hay and pasture.

Most of the farms in this association are more than 200 acres in size. Some are operated by the owner, and others, by tenants.

9. *Huntington-Egam-Captina association*

Chiefly nearly level, deep, well drained to moderately well drained soils of narrow first bottoms, stream terraces, and foot slopes

This association consists mainly of nearly level, deep soils on narrow first bottoms, stream terraces, and foot slopes (fig. 9). Some of the areas are along Hinkston, Flat, White Oak, and Slate Creek and their tributaries. Others are along the edges of limestone valleys. The valleys are generally narrow, but the one along Slate Creek is nearly a mile wide at its mouth. The soils of this association occupy about 8 percent of the county. They are in the northern and eastern parts.

The dominant soils of this association are the Huntington, Egam, and Captina. A smaller acreage of Woolper, Sees, Lindside, Newark, Melvin, Dunning, Elk, Taft, Robertsville, and Ashton soils is included.

The Huntington soils occupy about half of the acreage on first bottoms. The rest of the acreage on first bottoms is occupied by Egam, Lindside, Newark, Melvin, and Dunning soils. The Huntington soils are well drained; the Egam and Lindside soils are moderately well drained; the Newark soils, somewhat poorly drained; the Melvin soils, poorly drained; and the Dunning soils, very poorly drained. Normally, the Huntington soils are nearest the stream. The Melvin and the dark-colored, fine-textured Dunning soils are in depressions farthest from the stream.

The soils on first bottoms and toe slopes along White Oak Creek and its tributaries are generally fine textured because they formed mainly in material washed from fine-textured soils. A few of these soils are poorly drained. As a whole, however, they are better drained than the soils of valleys that were formed in alluvium derived from acid sandstone, shale, and siltstone. The soils on first bottoms and toe slopes are nearly neutral.

At a higher elevation than the soils on first bottoms are the soils of terraces, or second bottoms. Of these, the

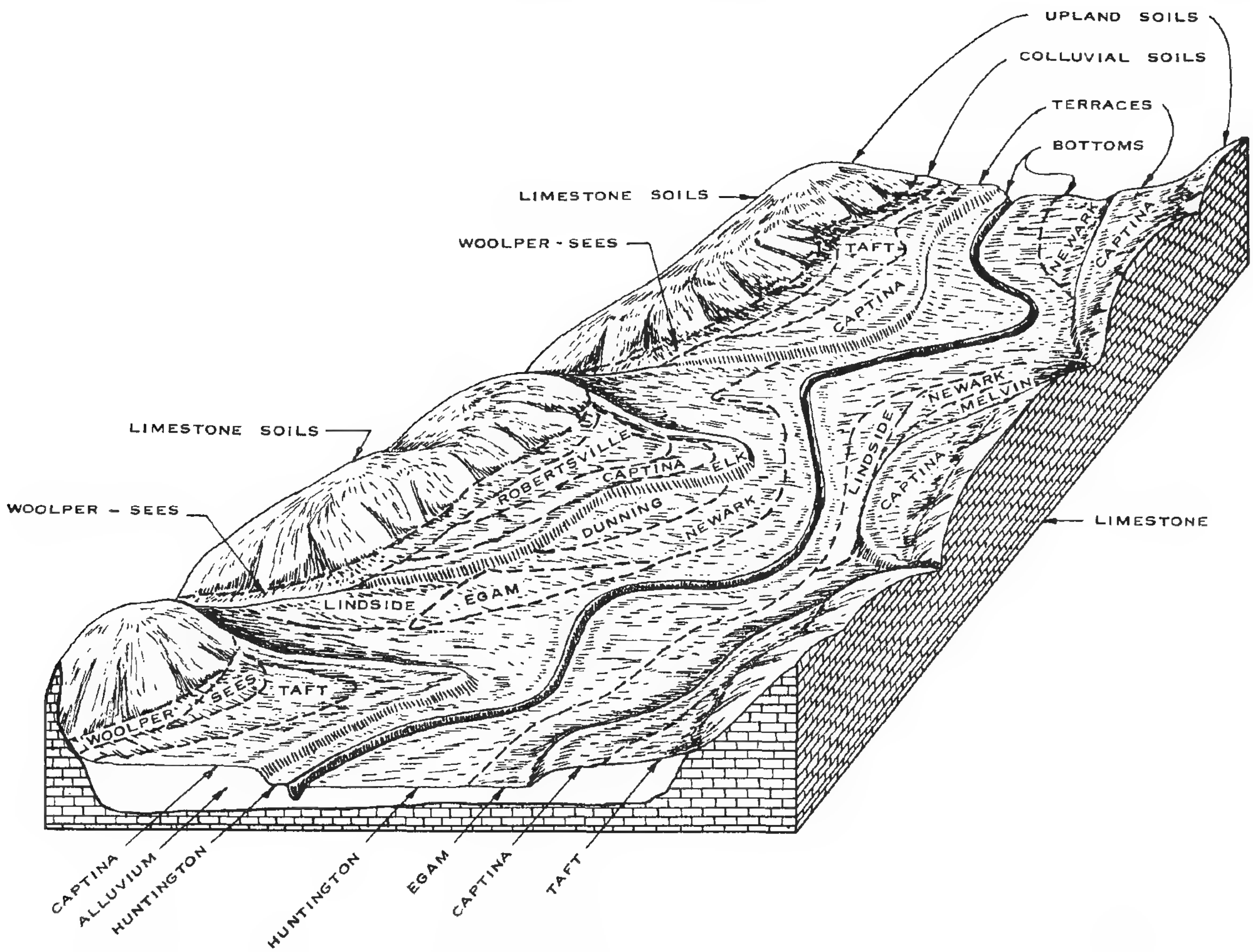

Figure 9.—**Typical landscape showing the relative position of the principal soils in a limestone valley in association 9.**

dominant soils are the well drained Elk, the moderately well drained Captina, the somewhat poorly drained Taft, and the poorly drained Robertsville. The Captina soils are the most extensive of these soils. The soils of terraces, or second bottoms, are chiefly along Slate Creek and are above the present flood plain. They differ mainly in degree of drainage. All of these soils, except the Elk, have a fragipan.

At a still higher elevation than the soils on first bottoms are the soils on foot slopes. Of these, the well-drained Woolper and Ashton soils are dominant, but there is a small acreage of somewhat poorly drained Sees soils. The Ashton soils are somewhat coarser textured than the Woolper and Sees soils.

The soils in this association are very fertile and are well suited to all of the crops commonly grown in the county. Tobacco grows well on the first bottoms, but it is usually grown on the toe slopes or terraces, where it will not be damaged by floodwaters. Some corn is grown, but most of the association is used for pasture and hay of good quality.

Soils of the Eden Hills

In the northwestern part of the county are areas, highly dissected by narrow valleys, that are called the Eden Hills. The soils of these areas have strong slopes. In places there are thin slabs of limestone on the surface. Most of the acreage in the Eden Hills has been used for crops, but now much of it is in pasture. Some areas are idle or are covered by scrub trees. The following association is in this general area:

10. *Eden-Lowell association*

Steep, moderately deep, somewhat droughty soils of highly dissected uplands

This association consists of highly dissected areas (fig. 10) along the border between Bath and Nicholas Counties. The soils in the association formed mainly in material weathered from interbedded limestone, calcareous shale, and siltstone, but, in small areas at the highest elevations, they formed in material weathered from calcareous sand-

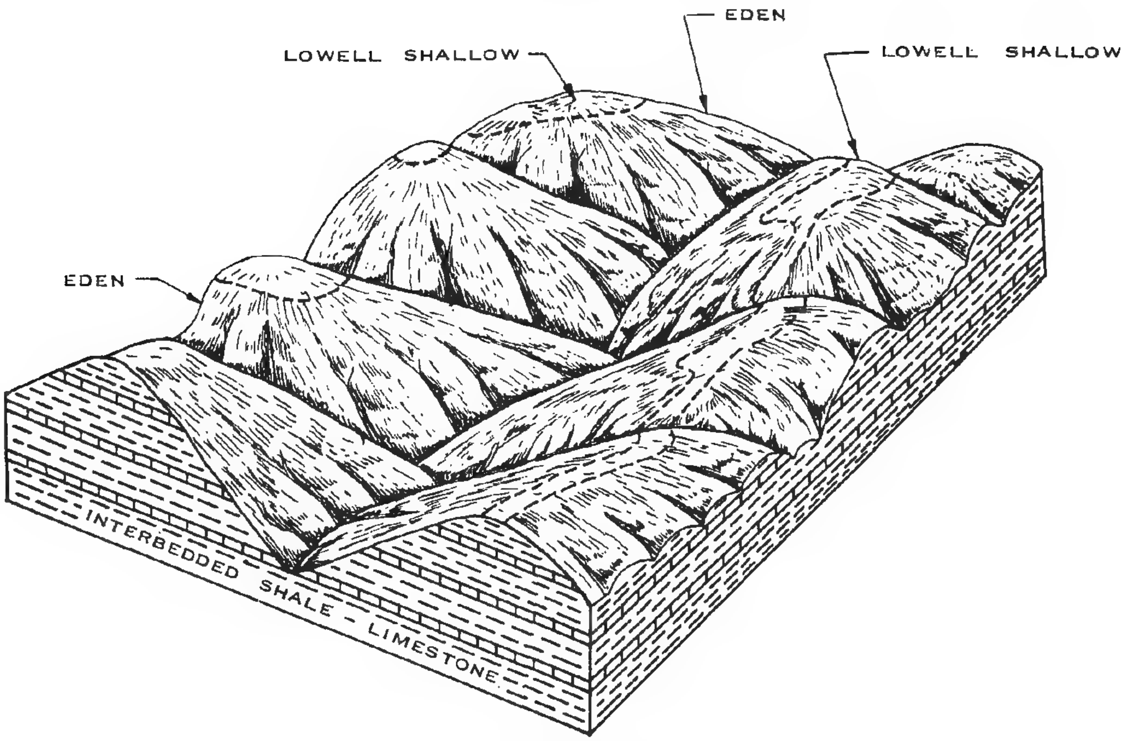

Figure 10.—**Typical landscape in the Eden Hills area showing the topography and relative position of the soils in association 10.**

stone. This association occupies approximately 4 percent of the county.

The Eden soils, on hillsides, are dominant in this association. The shallow Lowell soils, on the ridgetops and milder slopes, are less extensive. The Eden soils are moderately deep and fertile. They are somewhat excessively drained as the result of the large amount of runoff, and they are nearly neutral. In areas where the Eden soils are eroded, the surface layer is fine textured. The Lowell soils have a thicker, browner, and more acid subsoil than the Eden soils.

Because of the steep slopes, the soils of this association are poorly suited to row crops. On some of the slopes, hay crops are difficult to mow because of the slabs of loose limestone. In favorable years grass grows well on these soils, but grazing needs to be controlled carefully during dry seasons. Most of the association is in pasture, and fairly good yields of forage are obtained. The very steep areas are idle or in scrub trees.

The farms in the association are more than 100 acres in size. They are operated mainly by the owner.

How Soils Are Named, Mapped, and Classified

Soil scientists made this survey to learn what kinds of soils are in Bath County, where they are located, and how they can be used.

They went into the county knowing they likely would find many soils they had already seen, and perhaps some they had not. As they traveled over the county, they observed steepness, length, and shape of slopes; size and speed of streams; kinds of native plants or crops; kinds of rock; and many facts about the soils. They dug or bored many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down to the rock material that has not been changed much by leaching or by roots of plants.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to uniform procedures. To use this report efficiently, it is necessary to know the kinds of groupings most used in a local soil classification.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Shrouts and Fleming, for example, are the names of two soil series. All the soils in the United States having the same series name are essentilly alike in natural characteristics.

Many soil series contain soils that differ in the texture of their surface layer. According to such differences, separations called soil types are made. Within a series, all the soils having a surface layer of the same texture belong to one soil type. Fleming silt loam and Fleming cherty silty clay loam are two soil types in the Fleming series. The difference in the texture of their surface layers is apparent from their names.

Some soil types vary so much in slope, degree of erosion, number and size of stones, or some other feature affecting

their use that practical suggestions about their management could not be made if they were shown on the soil map as one unit. Such soil types are divided into soil phases. The name of a soil phase indicates a feature that affects management. For example, Fleming silt loam, 6 to 12 percent slopes, eroded, is one of several phases of Fleming silt loam, a soil type that ranges from undulating to steep.

After a fairly detailed guide for classifying and naming the soils had been worked out, the soil scientists drew soil boundaries on aerial photographs. They used photos for their base map because they show woodlands, buildings, borders of fields, trees, and similar detail that greatly help in drawing boundaries accurately. The soil map in the back of this report was prepared from the aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning management of farms and fields, a mapping unit is nearly equivalent to a soil type or a phase of a soil type. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil type or soil phase.

In preparing some detailed maps, the soil scientist has a problem of delineating areas where different kinds of soils are so intricately mixed or occur in such small individual tracts that it is not practical to show them separately on the map. Therefore, he shows this mixture of soils as one mapping unit and calls it a soil complex. Ordinarily, a soil complex is named for the major soil series in it, for example, Fairmount-rock land complex, 6 to 20 percent slopes, eroded. Also, in most mapping, there are areas to be shown that are so rocky, so shallow, or so frequently worked by wind and water that they cannot be called soils. These areas are shown on a soil map, but they are given descriptive names, such as Gullied land or Terrace escarpments, and are called land types rather than soils.

Only part of the soil survey was done when the soil scientist had named and described the soil series and mapping units and had shown the location of the mapping units on the soil map. The mass of detailed information he had recorded then needed to be presented in different ways for different groups of users, among them farmers, managers of woodlands and rangelands, and engineers. To do this efficiently, he had to consult with persons in other fields of work and jointly prepare with them groupings that would be of practical value to different users. Such groupings are the capability classes, subclasses, and units, designed primarily for those interested in producing the short-lived crops and tame pasture; woodland suitability groups, for those who need to manage wooded tracts; and the classifications used by engineers who build highways or structures to conserve soil and water.

Descriptions of Soils

This section is provided for those who want detailed information about the soils in the county. It describes the individual soils, or mapping units; that is, the areas on the detailed soil map that are bounded by lines and are identified by a symbol. For more general information about the soils, the reader can refer to the section "General Soil Map," in which the broad patterns of soils are described. The acreage and proportionate extent of each soil mapped in the county are given in table 1. Their location is shown on the soil map at the back of the report.

In the descriptions that follow, each soil series is first described, and then the soils in the series. The series description mentions features that apply to all of the soils it contains.

As a general rule, only one soil profile is described in detail for each series, and that profile is described under the first soil of the series. The profile described is considered to be representative for all the soils in the series. The descriptions of the other soils in the series generally tell how their profiles differ from the one given as representative of the series.

TABLE 1.—*Approximate acreage and proportionate extent of soils*

Soil	Area	Extent
	Acres	*Percent*
Allegheny loam, 2 to 6 percent slopes	300	0. 2
Allegheny loam, 6 to 12 percent slopes	383	. 2
Allegheny loam, 6 to 12 percent slopes, eroded	321	. 2
Allegheny loam, 12 to 20 percent slopes	539	. 3
Allegheny loam, 12 to 20 percent slopes, eroded	696	. 4
Ashton silt loam, 2 to 6 percent slopes	288	. 2
Ashton silt loam, 6 to 12 percent slopes	400	. 2
Ashton silt loam, 12 to 20 percent slopes	177	. 1
Atkins silt loam	1, 601	. 9
Atkins silty clay loam	2, 009	1. 1
Beasley silt loam, 2 to 6 percent slopes	360	. 2
Beasley silty clay loam, 2 to 6 percent slopes, eroded	622	. 3
Beasley silty clay loam, 6 to 12 percent slopes, eroded	2, 301	1. 3
Beasley silty clay loam, 12 to 20 percent slopes, eroded	1, 137	. 6
Beasley silty clay loam, 20 to 30 percent slopes, eroded	181	. 1
Beasley silty clay, 12 to 20 percent slopes severely eroded	556	. 3
Bedford silt loam, 0 to 2 percent slopes	333	. 2
Bedford silt loam, 2 to 6 percent slopes	722	0. 4
Blago silt loam, 0 to 4 percent slopes	273	. 1
Captina silt loam, 0 to 2 percent slopes	229	. 1
Captina silt loam, 2 to 6 percent slopes	1, 117	. 6
Captina silt loam, 6 to 12 percent slopes, eroded	259	. 1
Colyer shaly silt loam, 12 to 20 percent slopes	505	. 3
Colyer shaly silt loam, 20 to 30 percent slopes	918	. 5
Colyer shaly silt loam, 30 to 50 percent slopes	6, 846	3. 7
Colyer shaly silt loam, 50 to 60 percent slopes	3, 378	1. 8
Colyer shaly silty clay loam, 12 to 30 percent slopes, eroded	1, 227	. 7
Cruze silt loam, 2 to 8 percent slopes	603	. 3
Dunning silty clay loam	337	. 2
Eden soils, 12 to 20 percent slopes, eroded	386	. 2
Eden soils, 20 to 30 percent slopes, eroded	2, 427	1. 3
Eden soils, 30 to 50 percent slopes, eroded	2, 498	1. 4
Egam silty clay loam	2, 122	1. 2
Elk silt loam, 2 to 6 percent slopes	249	. 1
Elk silt loam, 6 to 12 percent slopes, eroded	293	. 2
Elk silt loam, 12 to 20 percent slopes, eroded	222	. 1
Fairmount flaggy silty clay loam, 6 to 12 percent slopes	602	. 3

TABLE 1.—*Approximate acreage and proportionate extent of soils*—Continued

Soil	Area	Extent
	Acres	*Percent*
Fairmount flaggy silty clay loam, 12 to 20 percent slopes	358	0.2
Fairmount flaggy clay, 6 to 20 percent slopes, severely eroded	5,472	3.0
Fairmount flaggy clay, 20 to 30 percent slopes, severely eroded	10,489	5.7
Fairmount flaggy clay, 30 to 60 percent slopes, severely eroded	7,520	4.1
Fairmount-rock land complex, 6 to 20 percent slopes, eroded	654	.4
Fairmount-rock land complex, 20 to 30 percent slopes, eroded	582	.3
Fleming cherty silt loam, 12 to 20 percent slopes, eroded	1,436	.8
Fleming cherty silty clay loam, thin solum, 12 to 25 percent slopes	866	.5
Fleming silt loam, 6 to 12 percent slopes, eroded	204	.1
Fleming silt loam, 12 to 20 percent slopes, eroded	295	.2
Gullied land	102	.1
Guthrie silt loam	287	.2
Hagerstown cherty silt loam, 6 to 12 percent slopes, eroded	477	.3
Hagerstown silt loam, 0 to 2 percent slopes	631	.3
Hagerstown silt loam, 2 to 6 percent slopes	875	.5
Hagerstown silt loam, 6 to 12 percent slopes, eroded	221	.1
Hagerstown silt loam, 12 to 20 percent slopes, eroded	128	.1
Huntington silt loam	3,889	2.1
Huntington gravelly silt loam	313	.2
Huntington stony silt loam, shallow	82	(1)
Jefferson gravelly silt loam, 2 to 12 percent slopes	179	.1
Jefferson gravelly silt loam, 12 to 20 percent slopes	268	.1
Johnsburg and Cavode silt loams, 0 to 2 percent slopes	713	.4
Johnsburg and Cavode silt loams, 2 to 6 percent slopes	1,821	1.0
Johnsburg and Cavode silt loams, 6 to 12 percent slopes	192	.1
Johnsburg and Cavode silt loams, 6 to 12 percent slopes, eroded	228	.1
Landisburg cherty silt loam, 2 to 12 percent slopes	246	.1
Lawrence silt loam	354	.2
Lindside silt loam	568	.3
Lowell silt loam, 2 to 6 percent slopes	2,307	1.3
Lowell silt loam, 2 to 6 percent slopes, eroded	830	.5
Lowell silt loam, 6 to 12 percent slopes	682	.4
Lowell silt loam, 6 to 12 percent slopes, eroded	7,672	4.2
Lowell silt loam, 12 to 20 percent slopes, eroded	2,871	1.6
Lowell silty clay loam, 6 to 12 percent slopes, severely eroded	842	.5
Lowell silty clay loam, 12 to 20 percent slopes, severely eroded	616	.3
Lowell silty clay loam, shallow, 2 to 6 percent slopes, eroded	755	.4
Lowell silty clay loam, shallow, 6 to 12 percent slopes, eroded	1,535	.8
Lowell silty clay loam, shallow, 12 to 20 percent slopes, eroded	5,188	2.8
Lowell silty clay loam, shallow, 20 to 30 percent slopes, eroded	2,923	1.6
Lowell silty clay loam, shallow, 30 to 50 percent slopes, eroded	569	.3
Lowell silty clay, shallow, 12 to 20 percent slopes, severely eroded	1,543	.8
Lowell silty clay, shallow, 20 to 30 percent slopes, severely eroded	1,154	.6
Lowell very rocky silty clay loam, 6 to 20 percent slopes, eroded	1,750	1.0
Lowell very rocky silty clay, 20 to 30 percent slopes, severely eroded	994	.5
Made land	738	.4
Melvin silt loam	205	.1
Monongahela fine sandy loam, 2 to 6 percent slopes	1,152	.6
Monongahela fine sandy loam, 6 to 12 percent slopes	525	.3
Monongahela fine sandy loam, 6 to 12 percent slopes, eroded	293	.2
Monongahela silt loam, 0 to 2 percent slopes	168	.1
Monongahela silt loam, 2 to 6 percent slopes	3,216	1.7
Monongahela silt loam, 6 to 12 percent slopes	788	.4
Monongahela silt loam, 6 to 12 percent slopes, eroded	401	.2
Mullins silt loam	354	.2
Muse silt loam, 6 to 12 percent slopes	568	.3
Muse silt loam, 12 to 20 percent slopes	514	.3
Muse silty clay loam, 6 to 12 percent slopes, eroded	244	.1
Muse silty clay loam, 12 to 20 percent slopes, eroded	1,085	.6
Muskingum stony silt loam, 6 to 20 percent slopes	975	.5
Muskingum stony silt loam, 20 to 30 percent slopes	616	.3
Muskingum stony silt loam, 30 to 50 percent slopes	1,220	.7
Muskingum stony silt loam, 50 to 80 percent slopes	11,116	6.1
Newark silt loam	1,321	.7
Nicholson silt loam, 0 to 6 percent slopes	469	.3
Otway silty clay, 6 to 12 percent slopes	375	.2
Otway silty clay, 6 to 12 percent slopes, eroded	1,269	.7
Otway silty clay, 12 to 20 percent slopes, eroded	3,033	1.7
Otway silty clay, 20 to 30 percent slopes, eroded	4,488	2.4
Otway silty clay, 30 to 50 percent slopes, eroded	1,362	.7
Philo silt loam	1,166	.6
Pope silt loam	1,766	1.0
Pope fine sandy loam	1,306	.7
Pope gravelly silt loam	484	.3
Purdy silt loam	2,028	1.1
Rarden silt loam, 2 to 6 percent slopes	283	.2
Rarden silt loam, 6 to 12 percent slopes	811	.4
Rarden silt loam, 12 to 20 percent slopes	592	.3
Rarden silty clay loam, 6 to 12 percent slopes, eroded	1,087	.6
Rarden silty clay loam, 12 to 20 percent slopes, eroded	175	.1
Robertsville silt loam	315	.2
Rockcastle silt loam, 12 to 20 percent slopes	598	.3
Rockcastle silt loam, 20 to 30 percent slopes	2,240	1.2
Rockcastle silt loam, 30 to 50 percent slopes	5,691	3.1
Rockcastle silty clay, 12 to 20 percent slopes, eroded	764	.4
Rockcastle silty clay, 20 to 30 percent slopes, eroded	455	.2
Rock land	482	.3
Sees silty clay loam, 2 to 6 percent slopes	242	.1
Sees silty clay loam, 6 to 12 percent slopes	262	.1
Sequatchie silty clay loam, heavy variant, 0 to 4 percent slopes	638	.3
Shelbyville silt loam, 2 to 6 percent slopes	3,939	2.1
Shelbyville silt loam, 6 to 12 percent slopes	736	.4
Shelbyville silt loam, 6 to 12 percent slopes, eroded	602	.3
Shrouts silty clay loam, 6 to 20 percent slopes	388	.2
Shrouts clay, 6 to 20 percent slopes, eroded	726	.4
Shrouts clay, 20 to 30 percent slopes, eroded	301	.2
Stendal silt loam	3,105	1.7

TABLE 1.—*Approximate acreage and proportionate extent of soils*—Continued

Soil	Area	Extent	Soil	Area	Extent
	Acres	*Percent*		*Acres*	*Percent*
Taft silt loam	766	0.1	Tyler fine sandy loam	698	0.4
Terrace escarpments	318	.4	Tyler silt loam	2,457	1.3
Tilsit silt loam, 2 to 6 percent slopes	265	.1	Whitwell silt loam	293	.2
Tilsit silt loam, 6 to 12 percent slopes	114	.1	Woolper silty clay loam, 2 to 6 percent slopes	221	.1
Trappist silt loam, 2 to 6 percent slopes	277	.2	Woolper silty clay loam, 6 to 12 percent slopes	628	.3
Trappist silt loam, 6 to 12 percent slopes, eroded	306	.2	Woolper silty clay loam, 12 to 20 percent slopes, eroded	395	.2
Trappist silt loam, 12 to 20 percent slopes, eroded	167	.2	Total	183,680	100.0

[1] Less than 0.1 percent.

The slope ranges, included in the names of most of the soils, are described by the following terms:

0 to 2 percent slopes	Nearly level.
2 to 6 percent slopes	Gently sloping.
6 to 12 percent slopes	Sloping.
12 to 20 percent slopes	Strongly sloping.
20 to 30 percent slopes	Moderately steep.
30 to 50 percent slopes	Steep.
50 percent slope or more	Very steep.

A slope of 2 percent is one that rises or falls 2 feet in every 100 feet of horizontal distance. The slope of the soils in the areas surveyed was measured by using a hand level.

The amount of erosion was also considered in naming and mapping the soils. In this county most of the soils were placed in one of three erosion classes. Soils that have lost less than 25 percent of their original surface layer, or topmost 7 inches, are said to have no erosion or only slight erosion; the word "eroded" is not in the name of such soils. The word "eroded" is a part of the name of soils that have lost 25 to 75 percent of their original surface layer through erosion; occasional shallow gullies are in these areas. The term "severely eroded" is part of the name of soils that have lost more than 75 percent of their surface soil. In severely eroded areas there are many shallow gullies. One mapping unit—Gullied land—consists of areas in which there is an intricate pattern of moderately deep or deep gullies. In those areas the profile of the soils has been destroyed, except in small areas between the gullies. Such areas are not suitable for crops or pasture.

Many terms used in the soil descriptions are defined in the Soil Survey Manual (*14*). Some are defined in the preceding section "How Soils Are Named, Mapped, and Classified;" others are described in the Glossary at the back of this report.

Allegheny Series

The Allegheny series consists of deep, well-drained soils of the terraces. In areas that are not eroded, the soils have a surface layer of brown to dark-brown loam and a subsoil of brown to dark-brown fine sandy clay loam or clay loam. The soils developed in old stream alluvium. The alluvium was washed mostly from soils that formed in material weathered from acid sandstone and shale, but partly from soils formed in material weathered from limestone. The Allegheny soils are naturally acid and have gentle to strong slopes.

Some areas of Allegheny soils are on the tops of highly dissected, old, high stream terraces. In those areas they are associated with the Fairmount soils, which occupy the steep side slopes. The Allegheny soils are coarser textured and deeper than the Fairmount soils, and they have a more developed B horizon. They are better drained than the Monongahela soils, which are on the same kind of terraces.

The Allegheny soils are near Peasticks and along the Licking River. Most of the acreage has been cleared and is used mainly for row crops or pasture. A small acreage is idle.

Allegheny loam, 2 to 6 percent slopes (AgB).—This well-drained soil of stream terraces has a brown subsoil. The soil developed in old alluvium derived from sandstone and shale. The following describes a profile in a moist field along Highway No. 111, 0.3 of a mile north of Oakley:

A_p 0 to 7 inches, brown (10YR 4/3) to dark-brown (10YR 3/3) loam; weak, fine, granular structure; very friable; medium acid; clear, smooth boundary. 5 to 9 inches thick.

B_1 7 to 11 inches, brown (7.5YR 4/4) to dark yellowish-brown (10YR 4/4) heavy loam; weak, fine, subangular blocky structure; patchy clay films; friable; strongly acid; clear, smooth boundary. 3 to 6 inches thick.

B_{21} 11 to 20 inches, brown (7.5YR 4/4) fine sandy clay loam; moderate, medium, subangular blocky structure; noticeable reddish-brown clay films; firm to friable; few, small, rounded pebbles; very strongly acid; gradual, smooth boundary. 7 to 12 inches thick.

B_{22} 20 to 26 inches, brown (7.5YR 4/4) light clay loam; a few, fine, faint mottles of pale brown (10YR 6/3); moderate, medium, subangular and angular blocky structure; noticeable dark-brown clay films; firm; few, small, rounded pebbles; extremely acid; clear, smooth boundary. 4 to 8 inches thick.

B_3 26 to 37 inches, yellowish-brown (10YR 5/6) fine sandy clay loam; common, medium, distinct mottles of pale brown (10YR 6/3) and reddish yellow (7.5YR 6/8); weak, medium, subangular blocky structure; firm; dark stains on the surfaces of some peds; few small pebbles; extremely acid; clear, smooth boundary. 9 to 13 inches thick.

C 37 to 50 inches +, yellowish-brown (10YR 5/6) fine sandy clay loam; common, fine, faint mottles of light yellowish brown (2.5Y 6/4), light brownish gray (2.5Y 6/2), and reddish brown (5YR 4/4); massive or weak, medium and coarse, subangular blocky structure; friable to firm; small, rounded pebbles of sandstone and quartzite are common; extremely acid.

In this soil the B_{21} and B_{22} horizons are strong brown (7.5YR 5/6) in places, and in some profiles the texture of these horizons is clay loam. In places an incipient fragipan is at a depth of about 28 to 36 inches. The solum ranges from 30 to 48 inches in thickness, and the alluvial deposit ranges from 4 feet to more than 10 feet.

Mapped with this soil is a small acreage in which the texture of the surface layer is fine sandy loam; another small acreage in which the texture of the surface layer is silt loam; and still another small acreage in which the soil is eroded and the plow layer is a mixture of dark-brown loam and brown sandy clay loam. A few areas are included in which the soil is more leached than typical. In these leached areas the surface layer is lighter colored than that of the typical soil and the subsoil is less brown.

For Allegheny loam, 2 to 6 percent slopes, the hazard of erosion is moderately low. The root zone is deep, and the moisture-supplying capacity is high. Natural fertility is moderate, and the supply of plant nutrients is easy to build up. The soil has moderate permeability and is easy to till. The content of organic matter is medium. (Capability unit IIe-1; woodland suitability group 5.)

Allegheny loam, 6 to 12 percent slopes (AgC).—The profile of this well-drained soil is similar to that of Allegheny loam, 2 to 6 percent slopes. For this soil, the hazard of erosion is moderate. The root zone is deep, and the moisture-supplying capacity is high. The soil is high in natural fertility, and the supply of plant nutrients is easy to build up. This soil has moderate permeability and is medium in content of organic matter. It is easy to till. (Capability unit IIIe–1; woodland suitability group 5.)

Allegheny loam, 6 to 12 percent slopes, eroded (AgC2).—This well-drained soil developed in general alluvium derived from sandstone and shale. Its profile is similar to that of Allegheny loam, 2 to 6 percent slopes, but the A_p horizon is lighter colored and consists of a mixture of soil material from the former A and B horizons. Also, the subsoil is yellowish instead of brown.

Mapped with this soil is a small acreage in which the soil is severely eroded. The surface layer in the severely eroded areas has a slightly finer texture than that of the typical soil.

For Allegheny loam, 6 to 12 percent slopes, eroded, the hazard of further erosion is moderate. The root zone is deep, and the moisture-supplying capacity is very high. Natural fertility is moderate to low, but the supply of plant nutrients is easy to build up. This soil has moderate to moderately rapid permeability and is low in content of organic matter. It is easy to till. (Capability unit IIIe–1; woodland suitability group 5.)

Allegheny loam, 12 to 20 percent slopes (AgD).—This soil is well drained. It has a yellowish subsoil, but the profile is otherwise similar to that of Allegheny loam, 2 to 6 percent slopes. The soil developed in general alluvium derived from sandstone and shale. It is mainly on old, high stream terraces.

Mapped with this soil is a small acreage in which the texture of the surface layer is fine sandy loam and a small acreage in which the texture of the surface layer is silt loam. Also included is a small acreage in which the color of the B horizon is yellowish red (5YR 5/6).

For Allegheny loam, 12 to 20 percent slopes, the hazard of erosion is high. The root zone is deep, and the moisture-supplying capacity is very high. Natural fertility is moderately low, but the supply of plant nutrients is easy to build up. Permeability is moderate to moderately rapid, and the content of organic matter is low. The soil is easy to till, but farm machinery is difficult to use because of the strong slopes. (Capability unit IVe-1; woodland suitability group 5.)

Allegheny loam, 12 to 20 percent slopes, eroded (AgD2).—The profile of this soil is similar to that of Allegheny loam, 2 to 6 percent slopes, but the plow layer consists of a mixture of brown (10YR 4/3) loam and dark-brown (7.5YR 4/4) sandy clay loam. Small pebbles are common in the plow layer. The layer of alluvium that underlies this soil is 2 to about 5 feet thick, or somewhat thinner than that underlying Allegheny loam, 2 to 6 percent slopes.

Mapped with this soil is a small acreage in which the soil is not eroded and the plow layer is loam or fine sandy loam. Also included is a small acreage in which the soil is severely eroded. In the severely eroded areas, the plow layer is dominantly dark yellowish-brown fine sandy clay loam. In a few places there are shallow gullies.

For Allegheny loam, 12 to 20 percent slopes, eroded, the hazard of further erosion is high. The root zone is deep, and the moisture-supplying capacity is high. Natural fertility is moderate, but the supply of plant nutrients is easy to build up. Permeability is moderate, and the content of organic matter is low. The soil is easy to till, but the strong slopes make farm machinery difficult to use. (Capability unit IVe–1; woodland suitability group 5.)

Ashton Series

The Ashton series consists of deep, well-drained soils that are mainly on toe slopes, although some areas are on alluvial fans. In areas that are not eroded, the surface layer is dark-brown silt loam and overlies a subsoil of dark-brown to dark yellowish-brown silty clay loam. In the areas on toe slopes, the solum is underlain by silty clay at a depth below about 36 inches.

These soils developed in local alluvium washed mainly from Lowell, Shelbyville, and other soils that formed in material weathered from limestone. They are slightly acid to neutral and have gentle to strong slopes.

The Ashton soils on toe slopes and low terraces lie above areas of Huntington soils, which are on first bottoms. They are somewhat similar to the Huntington soils, but they have a more developed B horizon. In places the Ashton soils on toe slopes are associated with the Woolper soils. They are slightly more acid and are lighter colored than the Woolper soils. Their texture is also coarser, especially in the upper horizons.

The Ashton soils are in limestone valleys near Owingsville. They are fertile, and practically all of the areas are used for row crops or pasture.

Ashton silt loam, 2 to 6 percent slopes (AsB).—This deep, well-drained soil is on toe slopes or alluvial fans. It developed in alluvium washed from soils that formed in material weathered from limestone. The following

describes a profile in a moist field along the Flat Creek Road, about 1 mile north of U.S. Highway No. 60:

A_p 0 to 9 inches, dark-brown (10YR 4/3 or 3/3) silt loam; moderate, fine, crumb structure; friable; medium acid; gradual, smooth boundary. 7 to 10 inches thick.

B_1 9 to 18 inches, dark yellowish-brown (10YR 4/4) fine silt loam, or coarse silty clay loam; weak, fine, granular and weak, medium, subangular blocky structure; friable; slightly acid; gradual, smooth boundary. 8 to 10 inches thick.

B_{21} 18 to 25 inches, dark-brown (7.5YR 4/4) to dark yellowish-brown (10YR 4/4) silty clay loam; moderate, medium, subangular blocky structure; few patchy clay films; firm; slightly acid; gradual, smooth boundary. 5 to 9 inches thick.

B_{22} 25 to 36 inches, yellowish-brown (10YR 5/4) silty clay loam; moderate, medium, subangular blocky structure; few patchy clay films; firm; few, fine, dark, soft concretions; slightly acid; gradual, wavy boundary. 8 to 14 inches thick.

D 36 to 50 inches +, yellowish-brown (10YR 5/4) silty clay; few, fine, faint mottles of light yellowish brown (10YR 6/4); moderate, fine, blocky structure; firm, slightly sticky and plastic; common, fine, dark concretions; neutral. 1 to 4 feet thick.

In this soil the color of the A_p horizon ranges from dark brown (10YR 4/3 or 3/3) to very dark grayish brown (10YR 3/2). In places the B_{22} horizon is dark yellowish brown (10YR 4/4), and in places it is dark brown (7.5YR 4/4) or yellowish brown (10YR 5/6). In some places the color of the D horizon ranges to light olive brown (2.5Y 5/4). The structure of the D horizon ranges from strong to weak.

For this soil, the hazard of erosion is moderately low. The soil has a deep root zone and very high moisture-supplying capacity. It is high in natural fertility and is easy to till. Permeability is moderate in the upper part of the subsoil and moderately slow in the lower horizons. The content of organic matter is medium. (Capability unit IIe–1.)

Ashton silt loam, 6 to 12 percent slopes (AsC).—This soil is well drained and has a profile that is similar to that of Ashton silt loam, 2 to 6 percent slopes.

Mapped with this soil is a small acreage in which the soil is eroded. In the eroded areas the texture of the surface layer is silty clay loam.

For Ashton silt loam, 6 to 12 percent slopes, the hazard of erosion is moderate. This soil has a deep root zone and very high moisture-supplying capacity. It is high in natural fertility and is easy to till. Permeability is moderate in the upper part of the subsoil and moderately slow in the lower part. The content of organic matter is medium. (Capability unit IIIe–1.)

Ashton silt loam, 12 to 20 percent slopes (AsD).—This deep, well-drained soil has stronger slopes than Ashton silt loam, 2 to 6 percent slopes, but its profile is similar.

Mapped with this soil is a small acreage in which the soil is eroded. In the areas that are eroded, there are small patches in which the surface layer is silty clay loam.

For Ashton silt loam, 12 to 20 percent slopes, the hazard of erosion is moderately high. This soil has a deep root zone and very high moisture-supplying capacity. It is high in natural fertility. Although it is easy to cultivate, the strong slopes make the use of farm machinery difficult. Permeability is moderate in the upper part of the subsoil and moderately slow in the lower horizons. The content of organic matter is medium. (Capability unit IVe–1.)

Atkins Series

The Atkins series consists of naturally acid, poorly drained soils of first bottoms that are subject to occasional overflow. The surface layer of these soils is a mottled light brownish gray, and the underlying layers are a mottled gray. Recent alluvium was the material in which the soils developed. The alluvium washed from soils that formed in material weathered from acid sandstone, siltstone, and shale.

These soils are associated with the well drained Pope, the moderately well drained Philo, and the somewhat poorly drained Stendal soils. They are more poorly drained than any of these soils.

The Atkins soils are in the southeastern part of the county, which is underlain by sandstone and shale. Many of the areas are still covered by trees or brush, but some areas have been cleared and are used for row crops and pasture.

Atkins silt loam (0 to 2 percent slopes) (At).—This is a nearly level, poorly drained soil of first bottoms. It formed in alluvium derived from acid sandstone and shale. The following describes a profile in a moist field along Highway No. 211, 0.1 of a mile southwest of Salt Lick:

A_p 0 to 9 inches, light brownish-gray (10YR 6/2) silt loam; many, fine and medium, distinct mottles of red (2.5YR 4/6), yellowish red (5YR 4/6), and yellowish brown (10YR 5/6); moderate, medium, crumb structure; friable; medium acid; clear, smooth boundary. 7 to 11 inches thick.

C_{1g} 9 to 25 inches, light brownish-gray (10YR 6/2) fine silt loam; many, medium, distinct mottles of yellowish red (5YR 5/6 to 5/8) and yellowish brown (10YR 5/8; moderate to weak, fine and medium, granular structure; friable; very strongly acid; gradual, smooth boundary. 12 to 18 inches thick.

C_{2g} 25 to 48 inches +, gray (N 5/0) to light brownish-gray (10YR 6/2) silty clay loam; many, medium, distinct mottles of yellowish red (5YR 5/8) and strong brown (7.5YR 5/6); massive; firm, slightly sticky and plastic, hard when dry; very strongly acid.

In places the texture of the C_{2g} horizon is silty clay or sandy clay.

Mapped with this soil are a few small areas in which the texture of the surface layer is fine sandy loam.

Atkins silt loam is very wet, but, to some extent, drainage can be improved by tile. The root zone is deep, and the moisture-supplying capacity is very high. Natural fertility is moderately low, but the supply of plant nutrients is easy to build up. The soil has moderate permeability and is easy to till, but it is low in content of organic matter. (Capability unit IIIw–5; woodland suitability group 9.)

Atkins silty clay loam (0 to 2 percent slopes) (Ay).—This is a nearly level, poorly drained, fine-textured soil of first bottoms. It formed in alluvium washed mainly from soils that developed in material weathered from acid shale. The following describes a profile in a moist field along Mud Lick Creek, 3 miles southwest of Salt Lick:

A_p 0 to 5 inches, grayish-brown (2.5Y 5/2) silty clay loam; weak, coarse, granular structure; friable; very strongly acid; abrupt, smooth boundary. 4 to 8 inches thick.

C_{1g} 5 to 15 inches, light brownish-gray (2.5Y 6/2 or 5/2) silty clay loam to silty clay; a few, medium, distinct mottles of yellowish brown (10YR 5/6) and red (2.5YR 4/6); weak, medium and coarse, granular structure; firm, slightly sticky and slightly plastic;

extremely acid; gradual, smooth boundary. 8 to 14 inches thick.

C_{2g} 15 to 48 inches +, light brownish-gray (2.5Y 6/2) silty clay; many, coarse, distinct mottles of yellowish brown (10YR 5/4); massive; firm, sticky and plastic, very hard when dry. 20 to 40 inches thick.

Mapped with this soil are a few small areas of a Stendal silty clay loam and a small acreage of a Lickdale silty clay loam, overwash phase. Neither of these soils is mapped separately in Bath County. The Atkins soil has a lighter colored surface layer than the Lickdale soil and formed in general stream alluvium rather than local alluvium.

Atkins silty clay loam is very wet, but, to some extent, drainage can be improved by tile. The root zone is deep, and the moisture-supplying capacity is very high. Natural fertility is moderately low, but the supply of plant nutrients is easy to build up. Permeability is moderately slow, and the content of organic matter is low. The soil is somewhat difficult to till because of the moderately fine texture of the plow layer. (Capability unit IIIw-5; woodland suitability group 9.)

Beasley Series

The Beasley series consists of moderately deep to deep, well-drained soils of uplands. In areas that are not eroded, the soils have a surface layer of dark yellowish-brown silt loam and a subsoil of strong-brown or yellowish-red silty clay. The subsoil is underlain by variegated olive, calcareous clay. In these soils the upper part of the solum developed in material weathered from limestone, and the lower part, in material weathered from marl or soft, calcareous clay shale. The soils have slopes that are gentle to moderately steep.

These soils are associated with the Otway soils, which formed entirely in material weathered from marl. Their surface layer is lighter colored and coarser textured than that of the Otway soils, and they have a somewhat redder, thicker, and more developed B horizon. In addition, they are more nearly level and are on broader ridges than the Otway soils.

The Beasley soils occur in small areas. They are fairly extensive in the central part of the county and are in the areas called the Knobs and the Outer Bluegrass. Nearly all of the acreage has been cleared and is used for hay crops or pasture. A small acreage is in row crops or is idle.

Beasley silt loam, 2 to 6 percent slopes (BaB).—This is a well-drained soil of uplands. Its subsoil is strong brown or yellowish red and overlies marl. The following describes a profile in a moist field 1 mile north of White Oak Road along a private road, 1.6 miles west of Wyoming:

A_p 0 to 7 inches, dark yellowish-brown (10YR 4/4) silt loam; weak, very fine and fine, granular structure; friable; strongly acid; clear, smooth boundary. 5 to 8 inches thick.

B_1 7 to 11 inches, yellowish-brown (10YR 5/4 to 5/6) silty clay loam; weak to moderate, medium, subangular blocky structure; friable; medium acid; clear, smooth boundary. 2 to 6 inches thick.

B_{21} 11 to 19 inches, strong-brown (7.5YR 5/6) silty clay; moderate to strong, medium, blocky structure; thin, patchy clay films on the surfaces of peds; firm, sticky and plastic; medium acid; gradual, smooth boundary. 6 to 10 inches thick.

B_{22} 19 to 26 inches, strong-brown (7.5YR 5/6) silty clay; few, fine, faint mottles of light yellowish brown (2.5Y 6/4); strong, medium, blocky structure; thin clay films on the surfaces of peds; few, very fine, dark concretions; firm, sticky and plastic; slightly acid; clear, smooth boundary. 6 to 9 inches thick.

B_3 26 to 34 inches, light olive-brown (2.5Y 5/4) to olive (5Y 5/4) clay with common, fine, distinct mottles of yellowish brown (10YR 5/4); moderate, medium and coarse, blocky structure; thin, patchy clay films on the surfaces of peds; many small, dark-brown concretions; mildly alkaline; clear, smooth boundary. 4 to 10 inches thick.

C 34 to 46 inches, olive (5Y 5/3) clay with variegations of olive brown (2.5Y 4/4) and yellowish brown (10YR 5/4); contains pockets of light yellowish-brown (2.5Y 6/4) sandy clay; mostly massive but has a relict, platy structure; firm, sticky and plastic; few, small, dark concretions; strongly alkaline and calcareous; gradual, wavy boundary. 8 to 16 inches thick.

D_r 46 inches +, interbedded sandy dolomitic limestone and gray, calcareous clay shale, or marl.

In places the A_p horizon is brown (10YR 4/3) or dark grayish brown (10YR 4/2) and the color of the B_1 horizon ranges to brownish yellow (10YR 6/6). In other places the color of the B horizons is yellowish red (5YR 4/6) or red (2.5YR 4/6). In most places clay shale is at a depth of 20 to 36 inches.

Mapped with this soil are a few small areas in which the soil formed in old river alluvium; the surface layer in these areas is thin and has a texture of fine sandy loam. Also included is a small acreage in which the surface layer contains chert, and a few small areas on toe slopes, where the soil is similar to the typical Beasley soil but formed in local alluvium. The areas on toe slopes are below the areas of Beasley soil.

For Beasley silt loam, 2 to 6 percent slopes, the hazard of erosion is moderately low. The root zone is deep, and the moisture-supplying capacity is high. Natural fertility is moderate, but the supply of plant nutrients is easy to build up. Permeability is moderate in the upper part of the subsoil and moderately slow in the lower part. The content of organic matter is medium. The soil is easy to till. (Capability unit IIe-2.)

Beasley silty clay loam, 2 to 6 percent slopes, eroded (BcB2).—The plow layer of this well-drained soil is mainly yellowish-brown (10YR 5/6) silty clay loam, but in places it is dark yellowish-brown (10YR 4/4) silt loam. In other respects the profile is similar to that of Beasley silt loam, 2 to 6 percent slopes.

Mapped with this soil are small areas of a severely eroded soil in which there are a few shallow gullies. The plow layer in the severely eroded areas is mainly yellowish-brown silty clay loam, but there are spots of silty clay. Also included is a small acreage in which the surface layer contains chert and another small acreage of a soil that has a thin surface layer of fine sandy loam. In the areas that have a surface layer of fine sandy loam, the soil formed in old river alluvium.

For Beasley silty clay loam, 2 to 6 percent slopes, eroded, the hazard of further erosion is moderate. The root zone is moderately deep, and the moisture-supplying capacity is moderately high. Natural fertility is moderate, but the supply of plant nutrients is fairly easy to build up. This soil has moderately slow permeability and is low in content of organic matter. Because of the moderately fine texture

of the plow layer, the soil is somewhat difficult to till. (Capability unit IIe-4.)

Beasley silty clay loam, 6 to 12 percent slopes, eroded (BcC2).—This well-drained soil has a strong-brown or yellowish-red subsoil. Its profile is similar to that of Beasley silt loam, 2 to 6 percent slopes, but the plow layer is mainly yellowish-brown (10YR 5/6) silty clay loam with patches of dark yellowish-brown (10YR 4/4) silt loam.

Mapped with this soil is a small acreage in which the plow layer is dark yellowish-brown (10YR 4/4) silt loam. Also included is a small acreage of a severely eroded soil in which the plow layer is mainly yellowish-brown silty clay loam but contains patches of silty clay; these severely eroded areas have a few shallow gullies in places and small spots where marl outcrops. Other inclusions consist of a small acreage in which the surface layer contains chert; a small acreage in which the soil formed in old river alluvium and has a thin surface layer of fine sandy loam; and a few areas of a soil on toe slopes that formed in local alluvium.

For Beasley silty clay loam, 6 to 12 percent slopes, eroded, the hazard of further erosion is moderate. The root zone is moderately deep, and the moisture-supplying capacity is moderately high. Natural fertility is moderate, but the supply of plant nutrients is fairly easy to build up. Permeability is moderately slow, and the content of organic matter is low. Because of the moderately fine texture of the plow layer, tillage is somewhat difficult. (Capability unit IIIe-4.)

Beasley silty clay loam, 12 to 20 percent slopes, eroded (BcD2).—This is a well-drained soil on the upper parts of hillsides. Its profile is similar to that of Beasley silt loam, 2 to 6 percent slopes. It differs, however, in that the plow layer is mainly yellowish-brown (10YR 5/6) silty clay loam with which some dark yellowish-brown (10YR 4/4) silt loam has been mixed.

Mapped with this soil is a small acreage in which the surface layer is cherty silty clay loam.

For Beasley silty clay loam, 12 to 20 percent slopes, eroded, the hazard of further erosion is high. The root zone is moderately deep, and the moisture-supplying capacity is moderately high. Natural fertility is moderate, but the supply of plant nutrients is fairly easy to build up. Permeability is moderately slow, and the content of organic matter is low. Because of its steep slope and the moderately fine texture of the surface layer, this soil is not well suited to tilled crops. (Capability unit IVe-3.)

Beasley silty clay loam, 20 to 30 percent slopes, eroded (BcE2).—This well-drained soil is similar to Beasley silt loam, 2 to 6 percent slopes. It differs in that its plow layer is mainly yellowish-brown (10YR 5/6) silty clay loam with which some dark yellowish-brown (10YR 4/4) silt loam has been mixed. Also, this soil is steeper and is eroded.

Mapped with this soil is a small acreage of a severely eroded soil in which the plow layer is yellowish-brown silty clay loam mixed with strong-brown or yellowish-red silty clay. The severely eroded areas have a few shallow gullies in places, and also patches where marl outcrops. Also included is a small acreage in which the surface layer is cherty silty clay loam.

For Beasley silty clay loam, 20 to 30 percent slopes, eroded, the hazard of further erosion is high. The root zone is moderately deep, and the moisture-supplying capacity is moderately low. Natural fertility is moderate, but the supply of plant nutrients is fairly easy to build up. Permeability is moderately slow, and the content of organic matter is low. Because of its steep slope and the moderately fine texture of the surface layer, this soil is not well suited to tilled crops. (Capability unit VIe-1.)

Beasley silty clay, 12 to 20 percent slopes, severely eroded (BeD3).—Like the other Beasley soils, this soil is on the upper parts of hillsides. Its profile is similar to that of Beasley silt loam, 2 to 6 percent slopes, but the plow layer is strong-brown (7.5YR 5/6) to yellowish-red (5YR 5/6) silty clay. In places there are a few small gullies and patches where marl outcrops.

Mapped with this soil is a small acreage in which the surface layer is cherty silty clay loam.

For Beasley silty clay, 12 to 20 percent slopes, severely eroded, the hazard of further erosion is high. The root zone is moderately deep, and the moisture-supplying capacity is moderately low. Natural fertility is moderate, but the supply of plant nutrients is fairly easy to build up. Permeability is moderately slow, and the content of organic matter is very low. Because of the fine texture of the plow layer, this soil is difficult to till. The steep slopes also make farm machinery difficult to use. (Capability unit VIe-2.)

Bedford Series

The Bedford series consists of moderately well drained soils of the uplands that are underlain by limestone. The soils have a fragipan at a depth of about 24 inches. In areas that are not eroded, they have a surface layer of dark-brown silt loam that overlies a subsoil of yellowish-brown light silty clay loam. The soils developed in material weathered from limestone, but they are naturally acid.

These soils are on broad flats in the uplands. They are associated with the well-drained Hagerstown, the somewhat poorly drained Lawrence, and the poorly drained Guthrie soils. The Bedford soils are in slightly lower positions than the Hagerstown soils, are less well drained, and have a fragipan. They are in slightly higher positions than the Lawrence and Guthrie soils, are better drained, and have a less gray and less mottled subsoil.

The Bedford soils are fairly extensive southwest of Owingsville in the area called the Outer Bluegrass. Nearly all of the acreage has been cleared and is in row crops, hay, or pasture.

Bedford silt loam, 0 to 2 percent slopes (BfA).—This moderately well drained soil has a fragipan. The following describes a profile in a moist field along Highway No. 1331, opposite Peeled Oak Church:

A_p 0 to 9 inches, brown to dark-brown (10YR 4/3) silt loam; moderate, fine and medium, crumb structure; friable; medium acid; clear, smooth boundary. 6 to 11 inches thick.

A_2 9 to 14 inches, dark yellowish-brown (10YR 4/4) silt loam; weak, fine and medium, subangular blocky structure; friable; strongly acid; abrupt, smooth boundary. 4 to 7 inches thick.

B_2 14 to 24 inches, yellowish-brown (10YR 5/4 to 5/6) light silty clay loam; a few, fine, faint mottles of gray (10YR 6/1) and pale brown (10YR 6/3); moderate, fine and medium, blocky structure; friable; strongly acid; gradual, smooth boundary. 8 to 12 inches thick.

B_{3m1} 24 to 33 inches, yellowish-brown (10YR 5/4) silty clay loam; common, fine, faint mottles of light brownish gray (10YR 6/2) and brownish yellow (10YR 6/6); moderate, fine and medium, blocky structure; firm, compact in place; few, small, black concretions that are rounded and soft; strongly acid; clear, smooth boundary. 7 to 12 inches thick.

B_{3m2} 33 to 40 inches, mottled light-gray (10YR 7/2), yellowish-brown (10YR 5/6), and strong-brown (7.5YR 5/6) silty clay loam; mottles are many, medium, and distinct; massive to weak, medium, blocky structure; firm, compact in place; numerous, soft, black, rounded concretions that are irregular in shape; very strongly acid; gradual, smooth boundary. 6 to 10 inches thick.

C_1 40 to 48 inches, mottled strong-brown (7.5YR 5/6 to 5/8), yellowish-brown (10YR 5/6), and pale-brown (10YR 6/3) silty clay loam; mottles are many, fine and medium, and distinct; massive; firm, slightly compact in place; many, soft, black concretions; very strongly acid. 6 to 10 inches thick.

D_r 48 inches +, cherty Boyle dolomitic limestone of the Devonian geologic period.

The A_p horizon ranges from brown or dark brown (10YR 4/3) to very dark grayish brown (10YR 3/2) in color. Depth to the fragipan ranges from 18 to 26 inches.

Mapped with this soil are a few small areas in which the texture of the surface layer is cherty silt loam.

Bedford silt loam, 0 to 2 percent slopes, is slightly wet. Water stands in the shallow depressions after heavy rains, but tile drainage generally is not feasible. The root zone is moderately deep over the fragipan, and the moisture-supplying capacity is moderately high. Natural fertility is moderately high, and the supply of plant nutrients is fairly easy to build up. Permeability is moderate above the fragipan. The content of organic matter is medium, and the soil is easy to till. (Capability unit IIw-1.)

Bedford silt loam, 2 to 6 percent slopes (BfB).—This moderately well drained soil has a fragipan. Its profile is similar to that of Bedford silt loam, 0 to 2 percent slopes.

Mapped with this soil is a small acreage in which the soil is eroded and the plow layer is dark yellowish-brown (10YR 4/4) silt loam. Also included is a small acreage in which the slope is 6 to 12 percent.

For Bedford silt loam, 2 to 6 percent slopes, the hazard of erosion is moderately low. The soil is slightly wet, but tile drainage is not feasible. The root zone is moderately deep over the fragipan, and the moisture-supplying capacity is moderately high. The soil is moderate in natural fertility, but the supply of plant nutrients is fairly easy to build up. Permeability is moderate above the fragipan, and the content of organic matter is medium. The soil is easy to till. (Capability unit IIe-6.)

Blago Series

The Blago series consists of dark-colored, very poorly drained soils of stream terraces or second bottoms. The soils have a surface layer of black silt loam. The subsoil is mottled or gray silty clay loam throughout, but the lower part is finer textured than the upper part. The soils developed in ponded areas in alluvium washed from soils that formed in material weathered from acid sandstone and black fissile shale. They are naturally acid.

The Blago soils on stream terraces are associated with the Purdy soil, and they lie below the Cruze soil, which is on toe slopes. The Blago soils have a much darker surface layer than the Purdy soil, and they are higher in content of organic matter and do not have a fragipan. They have a darker colored surface layer and a more mottled, grayer subsoil than the Cruze soil.

Most areas of Blago soils have been cleared. Part of the acreage is used for row crops, and part is pastured.

Blago silt loam, 0 to 4 percent slopes (BoB).—This is the only Blago soil mapped in the county. The soil is along Salt Lick and Mud Lick Creeks. It is dark colored, very poorly drained, and naturally acid. The following describes a profile in a moist field along Highway No. 211, 1.9 miles south of Salt Lick:

A_{1p} 0 to 8 inches, black (N 2/0) silt loam; moderate to strong, fine and medium, granular structure; very friable; extremely acid; gradual, smooth boundary. 6 to 10 inches thick.

A_{12} 8 to 17 inches, very dark gray (10YR 3/1) silty clay loam; moderate, fine and medium, subangular blocky structure; friable; extremely acid; clear, smooth boundary. 7 to 16 inches thick.

B_g 17 to 21 inches, grayish-brown (10YR 5/2) fine silty clay loam; few, fine, distinct mottles of light yellowish brown (10YR 6/4); weak, medium, blocky structure; firm, slightly plastic; extremely acid; clear, smooth boundary. 3 to 8 inches thick.

C_{1g} 21 to 30 inches, pale-brown (10YR 6/3) silty clay; common, medium, distinct mottles of brownish yellow (10YR 6/6); massive; firm, slightly sticky and plastic, hard when dry; extremely acid; gradual, smooth boundary. 7 to 16 inches thick.

C_{2g} 30 to 48 inches +, gray (N 6/0) clay; many, medium, distinct mottles of strong brown (7.5YR 5/6); massive; very firm, slightly sticky and very plastic, very hard when dry; extremely acid.

The combined A horizons range from 10 to 26 inches in thickness. The natural drainage ranges from very poor in swampy areas to moderately good in small areas that are in higher positions.

Mapped with this soil are a few small areas in which the texture of the surface layer is silty clay loam. Also included is a small acreage of a soil on first bottoms that is somewhat similar to this soil.

Some areas of Blago silt loam, 0 to 4 percent slopes, are wet or very wet, but tile can be used to improve drainage. The root zone is moderately deep, and the moisture-supplying capacity is high. The soil is moderately high in natural fertility, and the supply of plant nutrients is easy to build up. Permeability is moderately slow to slow in the lower horizons. The content of organic matter is high. The soil is easy to till. (Capability unit IIIw-2.)

Captina Series

The Captina series consists of moderately well drained soils on stream terraces or second bottoms. The soils have a fragipan at a depth of about 20 inches. In areas that are not eroded, the surface layer is dark yellowish-brown silt loam and the subsoil is yellowish-brown silty clay loam. These soils are nearly level to sloping, and they developed in general alluvium washed from soils that formed in material weathered from limestone. Leaching, however, has caused them to be naturally acid.

The Captina soils are associated with the well-drained Elk, the somewhat poorly drained Taft, and the poorly drained Robertsville soils. They are less well drained than the Elk soils and have a fragipan. The Captina soils are better drained than the Taft and Robertsville

soils, and they also have a less gray, less mottled subsoil.

The Captina soils are along Slate Creek. Most of the acreage has been cleared. It is now mainly in row crops, hay of good quality, and pasture.

Captina silt loam, 0 to 2 percent slopes (CaA).—This soil is moderately well drained and has a fragipan. It is on terraces that are underlain by limestone. The following describes a profile in a moist field along Highway No. 111, 2.2 miles north of Slate Valley:

A_p 0 to 7 inches, dark yellowish-brown (10YR 4/4) silt loam; weak, fine, granular structure: friable; medium acid; clear, smooth boundary. 4 to 8 inches thick.

B_1 7 to 13 inches, yellowish-brown (10YR 5/6) fine silt loam or silty clay loam; weak to moderate, medium, subangular blocky structure; friable, slightly sticky; strongly acid; gradual, smooth boundary. 4 to 8 inches thick.

B_2 13 to 21 inches, yellowish-brown (10YR 5/6) silty clay loam; few, fine, faint mottles of pale brown (10YR 6/3); moderate, medium, subangular blocky structure; firm, slightly sticky; few, fine, dark grayish-brown concretions; strongly acid; clear, wavy boundary. 6 to 9 inches thick.

B_{3m1} 21 to 28 inches, yellowish-brown (10YR 5/6) to light olive-brown (2.5Y 5/6) silty clay loam; common, fine, distinct mottles of light brownish gray (10YR 6/2) and dark brown (7.5YR 4/4); massive to weak, medium, blocky structure; firm, compact in place; common, small, black concretions; very strongly acid; gradual, wavy boundary. 6 to 12 inches thick.

B_{3m2} 28 to 30 inches, mottled yellowish-brown (10YR 5/6), light-gray (2.5Y 7/2), and strong-brown (7.5YR 5/6) silty clay loam; common, fine and medium, distinct mottles; weak, medium, blocky structure to nearly massive; firm, compact in place; abundant, soft, black, concretionary material; very strongly acid; clear, smooth boundary. 2 to 8 inches thick.

C 30 to 40 inches, variegated strong-brown (7.5YR 5/6) and light-gray (2.5Y 7/2), partially weathered silt loam alluvium with patches of sandy loam and clay; massive, but somewhat porous; very strongly acid; abrupt, smooth boundary. 8 to 14 inches thick.

D_u 40 inches +, stratified gravelly layers that vary in content of silt, sand, and clay.

In some places the A_p horizon is brown (10YR 5/3) or grayish brown (10YR 5/2). Depth to the fragipan ranges from 16 to 24 inches. The alluvial deposit ranges from about 3 to 15 feet in thickness. In some profiles there is a small amount of chert.

Mapped with this soil are a few small areas of a Wolftever silt loam (not mapped separately in this county), which is slightly better drained than this soil. The lower part of the solum in the Wolftever soil is compact, but there is no discernible fragipan. Also included are other small areas of a soil that does not have a fragipan but that has silty clay in the lower part of the B horizon.

Captina silt loam, 0 to 2 percent slopes, is slightly wet; water stands in the depressions after heavy rains, and tile drainage is generally not feasible. The root zone is moderately deep over the fragipan, and the moisture-supplying capacity is moderately high. This soil is moderately high in natural fertility. Permeability is moderate above the fragipan, and the content of organic matter is medium. The soil is easy to till. (Capability unit IIw–1.)

Captina silt loam, 2 to 6 percent slopes (CaB).—This moderately well drained soil has a fragipan. It has stronger slopes than Captina silt loam, 0 to 2 percent slopes, but the profiles of the two soils are similar.

Mapped with this soil are small areas in which the soil is eroded. In the eroded areas the plow layer has a texture of silt loam, but its color is dark yellowish brown (10YR 4/4) mixed with yellowish brown (10YR 5/6). The fragipan is at a depth of about 16 inches.

For Captina silt loam, 2 to 6 percent slopes, the hazard of erosion is moderately low. The soil is slightly wet, and tile drainage is not feasible. The root zone is moderately deep over the fragipan, and the moisture-supplying capacity is moderately high. The soil is also moderately high in natural fertility. Permeability is moderate above the fragipan. The content of organic matter is medium, and the soil is easy to till. (Capability unit IIe–6.)

Captina silt loam, 6 to 12 percent slopes, eroded (CaC2).—This soil is moderately well drained and has a fragipan. Its profile is similar to that of Captina silt loam, 0 to 2 percent slopes, but the plow layer is dark yellowish brown (10YR 4/4) mixed with yellowish-brown (10YR 5/6). Also, depth to the fragipan ranges from about 14 to 18 inches.

Mapped with this soil are small areas in which the soil is not eroded. In these areas the plow layer is dark yellowish-brown (10YR 4/4) silt loam and depth to the fragipan is between 16 and 22 inches. Also included are small patches in which the soil is severely eroded. In the severely eroded areas, the plow layer is yellowish-brown silty clay loam and the fragipan is at a depth of 12 to 16 inches.

For Captina silt loam, 6 to 12 percent slopes, eroded, the hazard of further erosion is moderate. The root zone is shallow over the fragipan, and the moisture-supplying capacity is moderately low. Natural fertility is moderately high, and permeability is moderate above the fragipan. The content of organic matter is medium to low, and the soil is easy to till. (Capability unit IIIe–8.)

Cavode Series

The Cavode series consists of moderately well drained soils formed in material weathered from interbedded gray or yellow clay shale and clay. In this county the Cavode soils commonly adjoin or are near areas of Johnsburg soils and are mapped in undifferentiated units with the Johnsburg soils. For a detailed description of a typical Cavode profile, turn to the description of Johnsburg and Cavode silt loams, 0 to 2 percent slopes.

Colyer Series

The Colyer series consists of shallow to very shallow, somewhat excessively drained to excessively drained soils on hillsides. In areas that are not eroded, the soils have a thin surface layer of grayish-brown to light yellowish-brown shaly silt loam. Below the surface layer are thin, discontinuous layers of strong-brown silty clay to silty clay loam underlain by weathered shale.

The Colyer soils developed in material weathered from acid, black fissile shale, and they are therefore naturally acid. They are on narrow ridgetops and on the steep side slopes. The slopes are strong to very steep.

On the steep slopes these soils are associated with the somewhat excessively drained Muskingum and Rockcastle soils and with the well-drained Trappist soils. They are in positions below those occupied by the Mus-

kingum and the Rockcastle soils. The Colyer soils are shallower than any of these associated soils. Their parent material differs from that of the Muskingum and Rockcastle soils, and they have a coarser textured subsoil than the Rockcastle soils. The Colyer soils have a lighter colored surface layer than the Trappist soils, and their profile is much less developed.

The dominant vegetation on the Colyer soils consists of Virginia pines and of different kinds of oaks. A few areas have been cleared and are used for pasture or, to a lesser extent, for field crops.

Colyer shaly silt loam, 12 to 20 percent slopes (CoD).—This somewhat excessively drained soil developed in material weathered from black fissile shale. The following describes a profile in a moist field along a gravel road, 2.3 miles southwest of Olympia:

- A_{00} 1 to ½ inch, scattered leaves and twigs of white oaks.
- A_0 ½ inch to 0, partly decomposed twigs, leaves, roots, and moss.
- A_1 0 to 2 inches, grayish-brown (10YR 5/2) shaly silt loam; moderate, fine, granular structure; friable; very strongly acid; gradual, wavy boundary. 1 to 3 inches thick.
- A_3 2 to 6 inches, light yellowish-brown (10YR 6/4) fine shaly silt loam; a few, fine, faint mottles of grayish brown (10YR 5/2); weak, fine, and medium, subangular blocky structure; firm; extremely acid; clear, smooth boundary. 2 to 5 inches thick.
- C 6 to 14 inches, strong-brown (7.5YR 5/6) silty clay and partly weathered shale with variegations of light brownish gray (10YR 6/2) and yellowish red (5YR 5/6); moderate, medium, angular blocky structure; firm; slightly sticky and slightly plastic; extremely acid; clear, irregular boundary. 6 to 12 inches thick.
- D_r 14 inches +, slightly weathered, black fissile shale of the Devonian and Mississippian geologic periods.

In places the A_1 horizon is dark brown (10YR 4/3) or dark grayish brown (10YR 4/2), and in some places the A_3 horizon is strong brown (7.5YR 5/6) or brown (10YR 5/3). In some profiles there are strong-brown (7.5YR 5/6) or yellowish-brown (10YR 5/4) layers of silty clay loam, 4 to 6 inches thick, that form a weak B horizon. The C horizon ranges from strong brown (7.5YR 5/6) to yellowish red (5YR 5/6), and, in thickness, from 6 inches to as much as 30 inches.

Mapped with this soil are a few small, scattered areas of a soil formed in material that accumulated as the result of soil creep. In these included areas the solum is thicker than that of the typical soil. Also included are small areas that are less sloping than typical.

For Colyer shaly silt loam, 12 to 20 percent slopes, the hazard of erosion is high. The root zone is shallow over shale, and the moisture-supplying capacity is low. Natural fertility is low, and the supply of plant nutrients is difficult to build up. Permeability is moderately rapid to moderately slow, and the content of organic matter is low. Although this soil is easy to cultivate, the steepness of the slope makes farm machinery difficult to use. (Capability unit VIs-3; woodland suitability group 1.)

Colyer shaly silt loam, 20 to 30 percent slopes (CoE).—This somewhat excessively drained soil developed from material weathered from black fissile shale. Its profile is similar to that of Colyer shaly silt loam, 12 to 20 percent slopes, but this soil has stronger slopes.

Mapped with this soil are a few small, scattered areas of a soil formed in material that accumulated as the result of soil creep. The solum in these areas is somewhat thicker than that of the typical soil.

For Colyer shaly silt loam, 20 to 30 percent slopes, the hazard of erosion is high. The root zone is shallow over shale, and the moisture-supplying capacity is very low. Natural fertility is low, and the supply of plant nutrients is difficult to build up. Permeability is moderately rapid to moderately slow, and the content of organic matter is medium. (Capability unit VIIs-1; woodland suitability group 1.)

Colyer shaly silt loam, 30 to 50 percent slopes (CoF).—This is a somewhat excessively drained soil on hillsides. It is similar to Colyer shaly silt loam, 12 to 20 percent slopes, but it has stronger slopes.

Mapped with this soil are a few small, scattered areas of a soil formed in material that accumulated as the result of soil creep. The solum in these areas is somewhat thicker than that of the typical soil. Also included are eroded areas in which the surface layer is predominantly strong-brown silty clay mixed with a lighter colored shaly silt loam. In addition, a few small areas of a very shaly soil are included in which the depth to the D_r horizon is commonly less than 6 inches.

For Colyer shaly silt loam, 30 to 50 percent slopes, the hazard of erosion is very high. The root zone is shallow over shale, and the moisture-supplying capacity is very low. Natural fertility is low, and the supply of plant nutrients is difficult to build up. Permeability is moderately rapid to moderately slow, and the content of organic matter is medium to low. (Capability unit VIIs-1; woodland suitability group 1.)

Colyer shaly silt loam, 50 to 60 percent slopes (CoG).—The profile of this soil is similar to that of Colyer shaly silt loam, 12 to 20 percent slopes, but this soil has stronger slopes. The soil is on hillsides and is somewhat excessively drained.

Mapped with this soil are a few small, scattered areas of a soil formed in material that accumulated as the result of soil creep. The solum in these areas is somewhat thicker than that of the typical soil. Also included are eroded areas in which the surface layer is predominantly a strong-brown silty clay mixed with a lighter colored shaly silt loam. In addition, a few small areas of a very shaly soil are included in which the depth to the D_r horizon is commonly less than 6 inches.

For Colyer shaly silt loam, 50 to 60 percent slopes, the hazard of erosion is very high. The root zone is shallow over shale, and the moisture-supplying capacity is very low. Natural fertility is low, and the supply of plant nutrients is difficult to build up. Permeability is moderately rapid, and the content of organic matter is medium to low. Slopes are too steep for the use of farm machinery. (Capability unit VIIs-3; woodland suitability group 1.)

Colyer shaly silty clay loam, 12 to 30 percent slopes, eroded (CsE2).—This excessively drained soil developed in material weathered from black fissile shale. In most places the plow layer is strong-brown (7.5YR 5/6) shaly silty clay loam, but in some places it is grayish-brown (10YR 5/2) silt loam. In other respects the profile is similar to that of Colyer shaly silt loam, 12 to 20 percent slopes.

Mapped with this soil are a few small areas of a very shaly soil in which the depth to the D_r horizon is commonly less than 6 inches.

For Colyer shaly silty clay loam, 12 to 30 percent slopes, eroded, the hazard of further erosion is very high. The root zone is very shallow over shale, and the moisture-supplying capacity is very low. Natural fertility is low, and the supply of plant nutrients is difficult to build up. This soil is moderately rapid to moderately slow in permeability and is very low in content of organic matter. Because of its moderately fine texture, it is somewhat difficult to till. The soil is too steep for cultivation. (Capability unit VIIs-3; woodland suitability group 1.)

Cruze Series

The Cruze series consists of deep, moderately well drained soils on toe slopes or alluvial fans. The surface layer of these soils is very dark grayish-brown silt loam, and the subsoil is very dark grayish-brown silt loam to silty clay loam. Below the subsoil, at a depth of about 30 inches, are layers of a gray material. These soils developed in local alluvium washed from soils of uplands that formed in black fissile shale. They are naturally acid and are gently sloping to sloping.

The Cruze soils occur in association with the Muse soils on toe slopes, with the Blago soil on terraces, and with the Atkins soils on first bottoms. They have a darker surface layer and are less well drained than the Muse soils, and they have more horizonation and are darker and better drained than the Atkins soils. The Cruze soils have a lighter colored surface layer and a browner subsoil than the Blago soil. They are also better drained than the Blago soil.

Nearly all of the acreage of Cruze soils has been cleared, but a small acreage is still in mixed hardwoods. Some areas are used for tobacco, and others are in hay crops or pasture. Still other areas are idle.

Cruze silt loam, 2 to 8 percent slopes (CzB).—This is the only Cruze soil mapped in the county. The soil is on low toe slopes or on alluvial fans in the area called the Knobs. It formed in material weathered from black fissile shale. The following describes a profile in a moist field three-fourths of a mile south of the junction of Mud Lick Road, along Highway No. 211:

A_1 0 to 4 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, granular structure; friable; nearly neutral; clear, smooth boundary. 3 to 5 inches thick.

A_2 4 to 12 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; friable; slightly acid; clear, smooth boundary. 4 to 9 inches thick.

B_1 12 to 19 inches, dark grayish-brown (10YR 4/2) fine silt loam; a few, fine, faint mottles of grayish brown (10YR 5/2) and a few, very fine specks of strong brown (7.5YR 5/6); moderate, medium and fine, subangular blocky structure; friable; strongly acid; clear, smooth boundary. 6 to 8 inches thick.

B_2 19 to 32 inches, dark grayish-brown (10YR 4/2) silty clay loam; common, medium, distinct mottles of brown (10YR 5/3) and dark grayish brown (2.5Y 4/2) to grayish brown (2.5Y 5/2); moderate, medium, subangular blocky structure; firm, slightly sticky and slightly plastic; a few pieces of brown shale; very strongly acid; clear, irregular boundary. 12 to 14 inches thick.

B_{3g} 32 to 38 inches, light brownish-gray (2.5Y 6/2) silty clay loam; common, medium, distinct mottles of yellowish brown (10YR 5/6) and yellowish red (5YR 4/6), and tongues of dark grayish brown (10YR 4/2); weak, medium and coarse, subangular blocky structure; firm, slightly sticky and plastic; very strongly acid; gradual, wavy boundary. 5 to 8 inches thick.

C 38 to 50 inches +, yellowish-red (5YR 4/6) to red (2.5YR 4/6) silty clay and highly weathered shale; common, medium, prominent variegations of gray (5Y 6/1) and yellowish brown (10YR 5/6); weak, coarse, blocky structure; firm, slightly sticky and plastic; very strongly acid.

In some areas the surface layer is dark grayish brown (10YR 4/2) and the combined A horizons are only about 5 inches thick. In places the B horizons are light yellowish brown (10YR 6/4) or dark yellowish brown (10YR 4/4).

For Cruze silt loam, 2 to 8 percent slopes, the hazard of erosion is moderately low. The root zone is deep, and the moisture-supplying capacity is very high. Natural fertility is moderate, but the supply of plant nutrients is easy to build up. Permeability is moderate in the upper part of the solum and moderately slow in the lower horizons. In places there are seepage spots. This soil is medium in content of organic matter, and it is easy to till. (Capability unit IIe-10.)

Dunning Series

The Dunning series is made up of dark-colored, very poorly drained soils formed in ponded areas on first bottoms. The soils are nearly neutral. Their surface layer is very dark grayish-brown silty clay loam that overlies grayish silty clay loam to clay. The material in which they formed is recent alluvium. The alluvium washed from soils that developed in material weathered from clayey limestone.

The Dunning soils are associated with the Egam soil on first bottoms. They are in positions below those occupied by fine-textured soils, such as the Otway, on hillsides, and the Fairmount and Sees soils, on toe slopes. The Dunning soils are more poorly drained than the Egam soil and have a more strongly mottled, grayer subsoil. They are less well drained and darker colored than the Sees soils. Also, the horizons in their profile are less clearly defined.

Nearly all areas of Dunning soils have been cleared. Most of the acreage is used for row crops or pasture.

Dunning silty clay loam (0 to 2 percent slopes) (Du).—This is the only Dunning soil mapped in the county. It is a dark-colored, fine-textured soil on first bottoms along streams, and it is in the part of the county underlain by limestone. The soil is very poorly drained and is nearly neutral. The following describes a profile in a moist field along East Fork Road, 0.1 of a mile south of the Chesapeake and Ohio Railroad crossing, 0.2 of a mile east of Preston:

A_p 0 to 7 inches, very dark grayish-brown (10YR 3/2) silty clay loam; moderate, fine, granular structure; friable; slightly acid; clear, smooth boundary. 6 to 10 inches thick.

C_{1g} 7 to 24 inches, olive-gray (5Y 4/2) silty clay loam to silty clay; few, fine, distinct mottles of yellowish brown (10YR 5/6); massive; firm, sticky and plastic; mildly alkaline; gradual, smooth boundary. 14 to 20 inches thick.

C_{2g} 24 to 48 inches +, grayish-brown (2.5Y 5/2) clay; common, medium, distinct mottles of yellowish brown (10YR 5/6); massive; firm to very firm, sticky and plastic, hard when dry; mildly alkaline.

In some places the A_p horizon is black (10YR 2/1), but in areas that are covered by overwash, it is dark grayish

brown (10YR 4/2). Depth to bedrock ranges from about 3 to 10 feet.

This soil is very wet, but the drainage can be improved by tile. The root zone is moderately deep, and the moisture-supplying capacity is high. The soil is high in natural fertility. It has moderate to moderately slow permeability and is high in content of organic matter. Because of its moderately fine texture, the soil is somewhat difficult to till. (Capability unit IIIw-7.)

Eden Series

The Eden series consists of nearly neutral, somewhat excessively drained soils on hillsides. In areas that are not eroded, they have a surface layer of dark grayish-brown silty clay loam and a subsoil of light olive-brown silty clay. Below the subsoil is light olive-brown clay. The soils are strongly sloping to steep and formed in material weathered from interbedded siltstone, limestone, and calcareous shale.

These soils are associated with the Lowell soils, but they are in lower positions than those soils. They are less acid than the Lowell soils and have less distinct horizons. In addition, they have a few thin slabs of limestone on the surface and in the surface layer.

The Eden soils are in the northwestern part of the county. Most of the areas were once cleared, but now some areas are covered by trees. Much of the acreage is used for pasture, and some areas are idle.

Eden soils, 12 to 20 percent slopes, eroded (EdD2).—These soils are somewhat excessively drained and are nearly neutral and predominantly fine textured. They are on narrow ridges and on hillsides, where they developed in material weathered from siltstone, shale, and thin-bedded limestone. The following describes a profile in a moist field near Little Flat Creek, 1.4 miles northwest of Bethel:

A_p 0 to 5 inches, dark grayish-brown (10YR 4/2 to 2.5Y 4/2) silty clay loam; moderate, fine and medium, granular structure; firm, slightly sticky and slightly plastic; few pieces of siltstone; neutral; abrupt, smooth boundary. 2 to 7 inches thick.

B_2 5 to 12 inches, light olive-brown (2.5Y 5/4) silty clay; few, fine, faint variegations of dark-yellowish brown (10YR 4/4 to 5/6); strong, fine and medium, blocky structure; firm, sticky and plastic; neutral; clear, smooth boundary. 2 to 9 inches thick.

C_1 12 to 18 inches, light olive-brown (2.5Y 5/4) clay; common, fine, faint variegations of dark yellowish brown (10YR 4/4) and light brownish gray (2.5Y 6/2); massive or very weak, medium and coarse, blocky structure; very firm, very sticky and very plastic; neutral; gradual, smooth boundary. 4 to 8 inches thick.

C_2 18 to 32 inches, light olive-brown (2.5Y 5/4 to 5/6) clay; common, fine, faint variegations of light olive gray (5Y 6/2); massive; very firm, very sticky and very plastic; some dark, soft concretionary material; neutral; abrupt, clear boundary. 10 to 20 inches thick.

D_r 32 inches +, interbedded siltstone, shale, and thin-bedded limestone of the Eden formation, Ordovician period.

In places there are thin slabs of limestone on the surface and in the surface layer. Also, in some places the surface layer is mildly alkaline instead of neutral. The profiles differ in different areas as the result of differences in the proportion of parent material derived from siltstone and in the proportion derived from limestone. In the areas where the parent material was derived mainly from siltstone, the A_p horizon is slightly acid; it is slightly thicker than that in the profile described and has a texture of silt loam. In areas where the parent material was derived from limestone or calcareous shale, the surface layer is finer textured. In some areas the solum is thicker than typical because a thin layer of material has accumulated over the alluvium as the result of soil creep. In places there is no B_2 horizon.

Mapped with these soils is a small acreage in which the slope is 6 to 12 percent. Also included are a few uneroded areas in which the surface layer is silt loam, and severely eroded areas where the surface layer is silty clay. In some places within the same general area, erosion ranges from little or none to severe. The pattern of erosion is too complex, however, for these differences in erosion to be shown on a map of the scale used.

For Eden soils, 12 to 20 percent slopes, eroded, the hazard of further erosion is moderately high. The root zone is moderately deep, and the moisture-supplying capacity is moderately low. Natural fertility is moderately high. Permeability is slow, and the content of organic matter is low. Because of the fine texture of the plow layer, tillage is somewhat difficult. Also, the steep slopes make farm machinery difficult to use. (Capability unit IVe-2; woodland suitability group 10.)

Eden soils, 20 to 30 percent slopes, eroded (EdE2).—These soils are fine textured, nearly neutral, and somewhat excessively drained. They formed on hillsides in material weathered from siltstone, shale, and thin-bedded limestone. Their profiles are similar to those of Eden soils, 12 to 20 percent slopes, eroded.

For these soils, the hazard of further erosion is high. The root zone is moderately deep, and the moisture-supplying capacity is moderately low. The soils are moderately high in natural fertility. Permeability is slow, and the content of organic matter is low. (Capability unit VIe-1; woodland suitability group 10.)

Eden soils, 30 to 50 percent slopes, eroded (EdF2).—These soils are similar to Eden soils, 12 to 20 percent slopes, eroded, but they have stronger slopes. They are fine textured, nearly neutral, and somewhat excessively drained. In places they have a few thin slabs of limestone on the surface and in the surface layer.

For these soils, the hazard of further erosion is very high. The root zone is moderately deep, and the moisture-supplying capacity is moderately low. The soils are moderately high in natural fertility. Permeability is slow, and the content of organic matter is low. (Capability unit VIIe-1; woodland suitability group 10.)

Egam Series

The Egam series consists of fine-textured soils that are well drained to moderately well drained and are nearly neutral. The surface layer, a dark-brown silty clay loam, is underlain by very dark grayish-brown silty clay that has mottling at a depth below about 24 inches. The soils developed in recent alluvium washed from soils that formed in material weathered from clayey limestone.

These soils occur on first bottoms in association with the Dunning soil. They lie below fine-textured soils, such as the Fairmount and Otway, which are on hillsides. The Egam soils are better drained than the Dunning and have

less mottling in the material that underlies the surface layer.

Nearly all of the acreage of Egam soils has been cleared. The areas are used for corn or pasture, which make high yields.

Egam silty clay loam (0 to 2 percent slopes) (Eg).—This is the only Egam soil mapped in this county. The soil is on first bottoms along streams in the steep part of the county underlain by limestone, and it is well drained to moderately well drained. The following describes a profile in a moist field along White Oak Road, 3.5 miles northeast of Highway No. 36 and 4.3 miles west of Wyoming:

A_p 0 to 7 inches, dark-brown (10YR 3/3) silty clay loam; moderate, fine and medium, subangular blocky structure; firm, hard when dry, slightly sticky and slightly plastic; neutral; clear, smooth boundary. 5 to 8 inches thick.

C_1 7 to 18 inches, dark-brown (7.5YR 3/2) to very dark grayish-brown (10YR 3/2) silty clay; moderate, medium, prismatic structure that breaks to strong, medium and coarse, blocky structure; very firm, very hard, sticky and plastic; noticeable clay films; neutral; gradual, wavy boundary. 10 to 13 inches thick.

C_2 18 to 48 inches +, dark-brown (10YR 3/3) silty clay; common, fine, faint mottles of dark grayish brown (2.5Y 4/2) to olive brown (2.5Y 4/4); moderate, medium, prismatic structure that breaks to strong, medium, blocky structure; very firm, very hard, sticky and plastic; moderately alkaline.

In some profiles the A_p horizon is brown (10YR 4/3) or dark grayish brown (10YR 4/2). In a few places there is a very dark gray, buried A_{1b} horizon between the A_p and C horizons; the buried horizon is somewhat compact. Some areas have little if any mottling in the C horizon. Depth to bedrock ranges from 3 to 8 feet.

Mapped with this soil are small areas of a soil formed in local alluvium, other small areas in which the soil is wet, and still other small areas of a well-drained soil that resembles the Huntington soils and that has a surface layer of silty clay loam.

Egam silty clay loam is slightly wet in places, but the drainage is improved easily by tile. The root zone is deep, and the moisture-supplying capacity is high. This soil is high in natural fertility, but it has moderately slow permeability. The content of organic matter is medium to high. Tillage is difficult because of the moderately fine texture of the plow layer. (Capability unit IIs–3.)

Elk Series

The Elk series consists of deep, well-drained soils of terraces or second bottoms. In areas that are not eroded, the surface layer is dark-brown silt loam, the upper part of the subsoil is dark-brown silt loam, and the lower part is dark-brown and yellowish-brown silty clay loam. The soils formed in old alluvium washed from soils that developed in material weathered from limestone. Because of leaching, however, they are naturally acid. Slopes range from gentle to strong.

These soils are associated with the moderately well drained Captina soils, the somewhat poorly drained Taft soil, and the poorly drained Robertsville soil. They are better drained than any of those soils and lack the fragipan that is characteristic of those soils.

The Elk soils are along Slate Creek. Nearly all of the acreage has been cleared. It is used mainly for row crops, pasture, and hay crops of good quality.

Elk silt loam, 2 to 6 percent slopes (EkB).—This deep, well-drained soil is on terraces along streams. The following describes a profile in a moist field along Highway No. 111, 0.1 of a mile north of Prickly Ash Creek:

A_p 0 to 9 inches, dark-brown (10YR 4/3 to 3/3) silt loam; weak, fine, granular structure; very friable; neutral; clear, smooth boundary. 6 to 10 inches thick.

B_1 9 to 15 inches, dark-brown (7.5YR 4/4)silt loam; weak to moderate, fine and medium, subangular blocky structure; friable; slightly acid; gradual, smooth boundary. 5 to 8 inches thick.

B_{21} 15 to 25 inches, dark-brown (7.5YR 4/4) to strong-brown (7.5YR 5/6) silty clay loam; moderate, medium, subangular blocky structure; thin clay films; friable; slightly sticky and slightly plastic; slightly acid; gradual, smooth boundary. 9 to 11 inches thick.

B_{22} 25 to 36 inches, yellowish-brown (10YR 5/6) silty clay loam; moderate, medium, subangular blocky structure; thin clay films; firm; slightly sticky and slightly plastic; medium acid; clear, smooth boundary. 10 to 12 inches thick.

B_3 36 to 48 inches, yellowish-brown (10YR 5/6) silty clay loam; common, fine, faint variegations of brownish yellow (10YR 6/6); moderate, medium and coarse, blocky structure; few clay films; firm, slightly sticky and slightly plastic; few, very fine, dark concretions; medium acid; gradual, smooth boundary. 10 to 14 inches thick.

C 48 to 54 inches, yellowish-brown (10YR 5/6) silty clay loam; common, fine, faint mottles of light yellowish brown (10YR 6/4); weak, coarse, blocky structure; firm, sticky and plastic; common black concretions, one-half inch in diameter, and a few pebbles; strongly to medium acid.

D_u 54 inches +, smoothed chert and clay loam interstitial soil material.

In some places the texture of the B_1 horizon is silty clay loam and the B_{22} horizon is strong brown (7.5YR 5/6). In a few profiles there is a weakly developed fragipan at a depth of 30 to 36 inches. The thickness of the deposit of alluvium ranges from 4 to more than 10 feet. In places beds of gravel and chert are at a depth of 4 to 5 feet.

Mapped with this soil is a small acreage in which the soil is eroded. In these areas the material in the A_p horizon is brown (10YR 4/3) mixed with dark brown (7.5YR 4/4). Also included are a few very small areas in which the slope is between 0 and 2 percent.

For Elk silt loam, 2 to 6 percent slopes, the hazard of erosion is moderately low. The root zone is deep, and the moisture-supplying capacity is very high. Natural fertility is high, and permeability is moderate. The content of organic matter is medium. The soil is easy to till. (Capability unit IIe–1.)

Elk silt loam, 6 to 12 percent slopes, eroded (EkC2).—This well-drained soil is on terraces that are underlain by limestone. Its profile is similar to that of Elk silt loam, 2 to 6 percent slopes, but the plow layer consists of a mixture of material that is brown (10YR 4/3) or dark brown (7.5YR 4/4).

Mapped with this soil is a small acreage in which the soil is not eroded. In these areas the plow layer is dark brown (10YR 4/3).

For Elk silt loam, 6 to 12 percent slopes, eroded, the hazard of further erosion is moderate. The root zone is deep, and the moisture-supplying capacity is very high. Natural fertility is high. Permeability is moderate, and

the content of organic matter is low. The soil is easy to till. (Capability unit IIIe-1.)

Elk silt loam, 12 to 20 percent slopes, eroded (EkD2).—This soil is well drained. In most places it is on escarpments that extend upward from first bottoms. The profile is similar to that of Elk silt loam, 2 to 6 percent slopes, but the plow layer consists of a mixture of material that is brown (10YR 4/3) or dark brown (7.5YR 4/4).

Mapped with this soil is a small acreage in which the soil is not eroded and the plow layer is dark-brown (10YR 4/3) silt loam. Also included are a few small areas in which the soil is severely eroded. In the severely eroded areas, there are a few shallow gullies in places and the plow layer is dominantly dark brown (7.5YR 4/4) silt loam mixed with silty clay loam.

For Elk silt loam, 12 to 20 percent slopes, eroded, the hazard of further erosion is moderately high. The root zone is deep, the moisture-supplying capacity is very high, and the soil is high in natural fertility. Permeability is moderate. The content of organic matter is low. The soil is easy to cultivate, but the steep slopes make farm machinery difficult to use. (Capability unit IVe-1.)

Fairmount Series

The Fairmount series consists of dark-colored, shallow, flaggy soils that are nearly neutral and somewhat excessively drained to excessively drained. In areas that are not eroded, the surface layer is dark-gray to very dark grayish-brown silty clay loam. The subsoil is dark yellowish brown and is thin and clayey. Below the subsoil are thin layers of light olive-brown clay. The soils are on narrow ridges and on side slopes. They are sloping to very steep and formed in material weathered from thin-bedded, clayey limestone.

These soils are associated with the Otway soils, but they are in lower positions on the sides of hills. They are more flaggy than the Otway soils and are underlain by limestone rather than marl.

The Fairmount soils are among the most extensive soils in the county. They are in the steepest part of the area called the Outer Bluegrass, north and west of Owingsville. All but the very steepest areas have been cleared and were once used for crops. Also, a number of years ago, turkeys were grazed on these areas. A large part of the acreage has been overgrazed or plowed extensively, and it is eroded. Much of it is now idle or in scrub timber, and little of it is used for crops. The soils are well suited to bluegrass, but the limited supply of moisture is a serious problem during dry seasons.

Fairmount flaggy silty clay loam, 6 to 12 percent slopes (FfC).—This is a dark-colored, flaggy, nearly neutral soil that is shallow and somewhat excessively drained. It is on narrow ridges. The following describes a profile in a moist field along Highway No. 1325, 3 miles north of Reynoldsville:

A_p 0 to 6 inches, dark-gray (10YR 4/1) to very dark grayish-brown (10YR 3/2) flaggy silty clay loam; strong, fine and medium, granular structure; firm, slightly sticky, slightly plastic; mildly alkaline; clear, smooth boundary. 4 to 8 inches thick.

B 6 to 12 inches, dark yellowish-brown (10YR 4/4) flaggy clay with pockets of dark grayish-brown (2.5Y 4/2) silty clay; strong, fine, blocky structure; thick, continuous clay films on the surfaces of peds; very firm, very sticky and very plastic; moderately alkaline; slightly calcareous; clear, irregular boundary. 4 to 8 inches thick.

C 12 to 17 inches, light olive-brown (2.5Y 5/4) flaggy clay with variegations of pale olive (5Y 6/3) and olive brown (2.5Y 4/4); massive; very firm, very sticky and very plastic; calcareous; clear, smooth boundary. 4 to 8 inches thick.

D_r 17 inches +, thin-bedded, light-gray, clayey limestone of the Richmond formation, Ordovician period.

In some places the A_p horizon is very dark gray (10YR 3/1) and the B horizon is olive-brown (2.5Y 4/4) clay. A few profiles have a thin B_1 or B_2 horizon of silty clay. In places the C horizon is a variegated light olive brown (10YR 5/4). Depth to bedrock ranges from 17 to 26 inches.

Mapped with this soil are a few small areas in which there is no flagstone in the surface layer, and a few areas in which the slope is 2 to 6 percent.

For Fairmount flaggy silty clay loam, 6 to 12 percent slopes, the hazard of erosion is moderately high. The root zone is moderately deep to shallow, and the moisture-supplying capacity is moderately low. The soil is high in natural fertility. Permeability is moderately slow, and the content of organic matter is high. The soil is somewhat difficult to till because of the fine texture of the plow layer and the pieces of flagstone on the surface and in the surface layer. (Capability unit IVe-6; woodland suitability group 10.)

Fairmount flaggy silty clay loam, 12 to 20 percent slopes (FfD).—This dark-colored, nearly neutral, somewhat excessively drained soil is on hillsides. Although it has stronger slopes than Fairmount flaggy silty clay loam, 6 to 12 percent slopes, the two soils have similar profiles.

For this soil, the hazard of erosion is high. The root zone is moderately deep to shallow over shattered rock, and the moisture-supplying capacity is moderately low. The soil is moderately high in natural fertility. Permeability is moderately slow, and the content of organic matter is high. (Capability unit VIe-1; woodland suitability group 10.)

Fairmount flaggy clay, 6 to 20 percent slopes, severely eroded (FaD3).—This rather dark-colored, nearly neutral soil is on narrow ridges and hillsides. It is excessively drained. The profile is somewhat similar to that of Fairmount flaggy silty clay loam, 6 to 12 percent slopes, but the plow layer consists mainly of material from the former B or C horizons and is a dark grayish-brown (2.5Y 4/2) to very dark grayish-brown (2.5Y 3/2) flaggy clay. Depth to the D_r horizon ranges from about 10 to 16 inches.

Mapped with this soil is a small acreage in which the slope is 2 to 6 percent. Also included is a very small acreage of Rock land.

For Fairmount flaggy clay, 6 to 20 percent slopes, severely eroded, the hazard of further erosion is high. The root zone is shallow over shattered rock, and the moisture-supplying capacity is very low. The soil is moderately high in natural fertility. Permeability is moderately slow, and the content of organic matter is medium to low. (Capability unit VIe-4; woodland suitability group 10.)

Fairmount flaggy clay, 20 to 30 percent slopes, severely eroded (FaE3).—This rather dark-colored, flaggy, nearly neutral soil is on hillsides. It is excessively drained. The profile is similar to that of Fairmount flaggy silty

clay loam, 6 to 12 percent slopes, but in most places the plow layer is dark grayish-brown (2.5Y 4/2) to very dark grayish-brown (2.5Y 3/2) flaggy clay that was formerly part of the subsoil. In a few areas the surface layer is very dark gray (10YR 3/1) silty clay. Depth to the D_r horizon ranges from about 7 to 16 inches.

Mapped with this soil are small areas in which the texture of the surface layer is silty clay loam and the rest of the profile is similar to that of Fairmount flaggy silty clay loam, 6 to 12 percent slopes. Also included is a small acreage of Rock land. In addition, near the Licking River, there are areas in which thin remnants of soils on old terraces have influenced the uppermost part of the profile.

For Fairmount flaggy clay, 20 to 30 percent slopes, severely eroded, the hazard of further erosion is very high. The root zone is very shallow to shallow over shattered rock, and the moisture-supplying capacity is very low. The soil is moderately high in natural fertility. Permeability is moderately slow, and the content of organic matter is medium to low. (Capability unit VIIe-2; woodland suitability group 10.)

Fairmount flaggy clay, 30 to 60 percent slopes, severely eroded (FaF3).—This is a rather dark-colored, nearly neutral, excessively drained soil on hillsides. Its profile is similar to that of Fairmount flaggy silty clay loam, 6 to 12 percent slopes, but the plow layer consists mainly of clayey parent material that is slightly darkened by organic matter. Also, depth to the D_r horizon ranges from about 7 to 16 inches.

Mapped with this soil is a small acreage in which the texture of the surface layer is silty clay loam and the rest of the profile is similar to that of Fairmount flaggy silty clay loam, 6 to 12 percent slopes. Also included is a small acreage of Rock land. In addition, near the Licking River, there are areas covered by a thin overwash consisting of remnants of old soils of terraces.

For Fairmount flaggy clay, 30 to 60 percent slopes, severely eroded, the hazard of further erosion is very high. The root zone is very shallow to shallow over shattered rock, and the moisture-supplying capacity is very low. The soil is moderate in natural fertility. Permeability is moderately slow, and the content of organic matter is medium to low. (Capability unit VIIe-2; woodland suitability group 10.)

Fairmount-rock land complex, 6 to 20 percent slopes, eroded (FmD2).—In this complex the profile in the areas of Fairmount soil is somewhat variable, but in most places it is dark colored and nearly neutral. Drainage is somewhat excessive. There are many outcrops of massive, yellowish-brown limestone in the areas. Geologically, this complex occurs at the point where rocks of the Ordovician period adjoin rocks of the Silurian period. The soils lie just below the black shale of the Devonian geologic period. They developed in material weathered from Brassfield limestone of the Silurian period and from Boyle limestone of the Devonian period.

The profile in the areas of Fairmount soils is basically like that of Fairmount flaggy silty clay loam, 6 to 12 percent slopes, but the characteristics vary somewhat, and rock outcrops that vary in size are common. The texture of the surface layer ranges from silty clay loam, in areas that are not eroded, to clay or silty clay, in areas that are eroded. The subsoil ranges from dark yellowish-brown (10YR 4/4) clay to yellowish-red (5YR 5/6) silty clay. In places the soil is underlain by marl rather than by limestone. Depth to bedrock is about 12 inches in most places, but the depth ranges from 4 to 30 inches.

For these soils, the hazard of further erosion is high. The root zone is moderately deep to very shallow over rock. The moisture-supplying capacity is very low, and natural fertility is moderate. Permeability is moderately slow, and the content of organic matter is medium to low. (Capability unit VIs-1; woodland suitability group 10.)

Fairmount-rock land complex, 20 to 30 percent slopes, eroded (FmE2).—In this complex the profile in the areas of Fairmount soil is somewhat variable, but in most places it is dark colored and nearly neutral. Drainage is somewhat excessive. Outcrops of massive, yellowish-brown limestone are numerous. Geologically, this complex occurs at the point where rocks of the Ordovician period come in contact with rocks of the Silurian period. The soils are just below the black shale of the Devonian period. They developed in material weathered from Brassfield and from Boyle limestone.

The characteristics of the soils in this complex are similar to those of Fairmount-rock land complex, 6 to 20 percent slopes, eroded, but the slope is steeper. Mapped with this complex are a few areas that have slopes that are greater than 30 percent.

For Fairmount-rock land complex, 20 to 30 percent slopes, eroded, the hazard of further erosion is very high. The root zone is moderately deep to very shallow, and the moisture-supplying capacity is very low. Natural fertility is moderate, permeability is slow, and the content of organic matter is moderate to low. (Capability unit VIIs-2; woodland suitability group 10.)

Fleming Series

The Fleming series consists of moderately deep to shallow, well-drained soils of uplands. In areas that are not eroded, the surface layer is dark-brown or dark reddish-brown silt loam and the subsoil is red to yellowish-red silty clay. Below the subsoil is pale-olive clay. The upper part of the profile of these soils formed in material weathered from limestone, and the lower part, in material weathered from soft clay shale. The soils are sloping to strongly sloping and are naturally acid.

These soils are on slopes below areas of Hagerstown soils and above areas of Rockcastle, Shrouts, or Rarden soils. The upper part of their profile is similar to that of the Hagerstown soils, but the lower part is similar to that of the Rockcastle and Rarden soils. In most areas the soils are cherty.

The Fleming soils are southwest of Owingsville, around the perimeter of the area called the Outer Bluegrass. Most of the acreage has been cleared. The soils are now used mainly for hay crops or pasture, but some row crops are grown.

Fleming cherty silt loam, 12 to 20 percent slopes, eroded (FnD2).—This is a well-drained, moderately deep soil. The upper part of its profile developed in material weathered from limestone, and the lower part, in material weathered from clay shale. The following describes a

profile in a moist field along a gravel road, 0.4 of a mile northwest of Kendall Springs:

A_p 0 to 5 inches, dark reddish-brown (5YR 3/4) cherty silt loam; few, fine, faint variegations of strong brown (7.5YR 5/6); moderate, fine, granular structure; friable; slightly acid; clear, smooth boundary. 4 to 7 inches thick.

B_1 5 to 10 inches, yellowish-red (5YR 4/6) to strong-brown (7.5YR 5/6) cherty silty clay loam; moderate, fine and medium, subangular blocky structure; firm; strongly acid; clear, smooth boundary. 3 to 7 inches thick.

B_{21} 10 to 19 inches, red (2.5YR 4/6) to yellowish-red (5YR 4/6) cherty silty clay; strong, fine, subangular blocky structure; noticeable clay films; firm; strongly acid; clear, wavy boundary. 7 to 12 inches thick.

B_{22} 19 to 25 inches, red (2.5YR 4/8) to yellowish-red (5YR 4/8) cherty clay; strong, fine and medium, angular blocky structure; noticeable clay films on peds; very firm, sticky and plastic; strongly acid; gradual, wavy boundary. 4 to 8 inches thick.

B_3 25 to 28 inches, yellowish-red (5YR 4/8) cherty clay with variegations of light yellowish brown (2.5Y 6/4); strong, fine, blocky structure; very firm, very sticky and very plastic; strongly acid; gradual, wavy boundary. 2 to 5 inches thick.

C 28 to 36 inches, pale-olive (5Y 6/3) clay with variegations of reddish brown (5YR 5/4); strong, fine, blocky structure; very firm, very sticky and very plastic; strongly acid; gradual, wavy boundary. 6 to 9 inches thick.

D_r 36 inches +, greenish-gray (5GY 6/1) clay shale with variegations of light reddish brown (5YR 6/4); clay shale is of the Crab Orchard formation, Silurian geologic period.

In places the A_p horizon is dark brown (7.5YR 4/4 to 4/2 or 3/2). In some places the B_1 horizon is strong brown (7.5YR 5/6) or reddish brown (5YR 4/4). The B_{21} and B_{22} horizons range from red to yellowish red or strong brown. The underlying clay shale ranges from very strongly acid to weakly calcareous. Depth to parent rock is as much as 60 inches. At a depth ranging from 24 to 40 inches, the profile has been strongly influenced by the underlying clay shale.

Mapped with this soil is a small acreage in which the soil is severely eroded. In the severely eroded areas, the surface layer is strong-brown (7.5YR 5/6) or yellowish-red (5YR 4/6) silty clay loam. Also included is a small acreage of an eroded Hagerstown cherty silty clay loam that has slopes of 12 to 30 percent.

For Fleming cherty silt loam, 12 to 20 percent slopes, eroded, the hazard of further erosion is high. The root zone is moderately deep over massive clay, and the moisture-supplying capacity is moderately low. Natural fertility is moderately high. Permeability is moderate to moderately slow in the upper part of the solum and slow in the lower part. The content of organic matter is medium. (Capability unit IVe–3.)

Fleming cherty silty clay loam, thin solum, 12 to 25 percent slopes (FoD).—The upper part of the profile of this well-drained, shallow soil formed in material weathered from limestone, and the lower part, in material weathered from acid clay shale. The following describes a profile in a moist field along Highway No. 1331, 0.2 of a mile east of Peeled Oak:

A_p 0 to 5 inches, dark-brown (7.5YR 3/2) cherty silty clay loam; moderate, fine, granular structure; friable to firm; slightly acid; clear, wavy boundary. 2 to 7 inches thick.

B_2 5 to 8 inches, strong-brown (7.5YR 5/6) silty clay; few, fine, faint variegations of yellowish red (5YR 5/6); moderate to strong, medium, subangular blocky structure; very firm, slightly sticky and plastic; strongly acid; gradual, wavy boundary. 2 to 7 inches thick.

C_1 8 to 12 inches, many, fine, distinct variegations of red (2.5YR 4/6), light olive-gray (5Y 6/2), and light olive-brown (2.5Y 5/6) clay; massive; very firm, slightly sticky and very plastic; medium acid; gradual, wavy boundary. 2 to 8 inches thick.

C_2 12 to 24 inches, variegated light olive-gray (5Y 6/2) and light olive-brown (2.5Y 5/4) clay; massive; sticky and very plastic; medium acid; gradual, wavy boundary. 10 to 26 inches thick.

D_r 24 inches +, gray clay shale of the Silurian geologic period; calcareous in spots.

In places the B_2 horizon is yellowish red (5YR 4/6) or red (2.5YR 4/6). Depth to the D_r horizon ranges from 18 to 30 inches.

Mapped with this soil is a small acreage in which the slope is between 6 and 12 percent.

For Fleming cherty silty clay loam, thin solum, 12 to 25 percent slopes, the hazard of erosion is high. The root zone is shallow to very shallow over massive clay. The moisture-supplying capacity is very low, and natural fertility is moderate. Permeability is moderately slow to slow. The content of organic matter is medium. (Capability unit VIs–3.)

Fleming silt loam, 6 to 12 percent slopes, eroded (FsC2).—The upper part of the profile in this well-drained, moderately deep soil formed in material weathered from limestone. The lower part formed in material weathered from clay shale. The profile is similar to that of Fleming cherty silt loam, 12 to 20 percent slopes, eroded, but this soil lacks the chert that is typical of the Fleming cherty silt loams, and it has milder slopes.

Mapped with this soil is a small acreage in which the soil is not eroded and another small acreage in which erosion has been severe. In the severely eroded areas, the surface layer is strong-brown (7.5YR 5/6) or yellowish-red (5YR 4/6) silty clay loam.

For Fleming silt loam, 6 to 12 percent slopes, eroded, the hazard of further erosion is moderate. The root zone is moderately deep over massive clay. The moisture-supplying capacity is moderately high, and the soil is moderately high in natural fertility. Permeability is moderate to moderately slow in the upper part of the solum and slow in the lower part. The content of organic matter is medium. This soil is easy to till. (Capability unit IIIe–2.)

Fleming silt loam, 12 to 20 percent slopes, eroded (FsD2).—This well-drained, moderately deep soil has a profile that is similar to that of Fleming cherty silt loam, 12 to 20 percent slopes, eroded, but it is free of chert.

Mapped with this soil is a small acreage in which the soil is severely eroded. In most of the severely eroded areas, the surface layer is strong-brown (7.5YR 5/6) or yellowish-red (5YR 4/6) silty clay loam.

For Fleming silt loam, 12 to 20 percent slopes, eroded, the hazard of further erosion is high. The root zone is moderately deep over massive clay. The moisture-supplying capacity is moderately high, and the soil is moderately high in natural fertility. Permeability is moderate to moderately slow in the upper part of the solum and slow in the lower part. The content of organic matter is medium. (Capability unit IVe–3.)

Gullied Land

Gullied land consists of land so cut by recent gullies that it is not suitable for crops. In these areas the soil profile has been largely destroyed.

Gullied land (Gn).—This miscellaneous land type is made up of areas in which there is an intricate pattern of moderately deep or deep gullies. Except in small areas between the gullies, the solum of the original soil has been destroyed by erosion. In some places sheet erosion has removed all or nearly all of the soil material and the substratum is exposed. In places the material that underlies the remnants of the solum has weathered from marl. In other places it has weathered from limestone or from acid shale.

For Gullied land, the hazard of further erosion is very high. The root zone is very shallow to shallow, and the moisture-supplying capacity is low. Natural fertility is moderate to low, and the content of organic matter is very low. (Capability unit VIIe-4.)

Guthrie Series

The Guthrie series consists of poorly drained soils on broad flats in the uplands. The soils have a fragipan. Their surface layer, a mottled grayish-brown to light grayish-brown silt loam, overlies a subsoil of gray silt loam or silty clay loam. Below the subsoil, at a depth of about 16 inches, is the fragipan, which is cherty. The Guthrie soils developed in material weathered from limestone, but leaching has caused them to be naturally acid. They are in nearly level areas or in depressions.

These soils are associated with the well drained Hagerstown, the moderately well drained Bedford, and the somewhat poorly drained Lawrence soils. They are less well drained than any of these soils and are grayer and more mottled near the surface. All of these soils formed in similar parent material, but the Guthrie soils are generally on flats or in depressions at slightly lower elevations than the other soils.

Most areas of Guthrie soils have been cleared and are used for hay crops or pasture. A few areas are idle or in cultivated crops.

Guthrie silt loam (0 to 2 percent slopes) (Gu).—This is the only Guthrie soil mapped in the county. It is mainly south of Owingsville in the part of the county called the Outer Bluegrass. The soil is poorly drained and has a fragipan. The following describes a profile in a moist field along the Kendall Springs road, 0.1 of a mile south of Kendall Springs:

A_p 0 to 6 inches, grayish-brown (2.5Y 5/2) to light brownish-gray (2.5Y 6/2) silt loam; few, fine, distinct mottles of brownish yellow (10YR 6/6) and strong brown (7.5YR 5/6); moderate, fine, crumb structure; friable; strongly acid; clear, smooth boundary. 3 to 7 inches thick.

B_g 6 to 16 inches, light-gray (N 7/0) to gray (N 5/0) silt loam; common, medium, distinct mottles of brownish yellow (10YR 6/6); moderate, fine and medium, angular blocky structure; friable; very strongly acid; clear, smooth boundary. 8 to 12 inches thick.

B_{mg} 16 to 45 inches, dominantly gray (N 6/0) cherty silty clay loam to silty clay; many, medium, prominent mottles of olive yellow (2.5Y 6/6), yellowish brown (10YR 5/6), and reddish yellow (5YR 6/8); massive to weak, fine and medium, blocky structure; friable; compact in place, slightly sticky, slightly plastic; abundant, coarse, soft, brown and black concretions; fragments of chert are common in the upper part and increase in abundance with increasing depth; very strongly acid; gradual, smooth boundary. 25 to 40 inches thick.

D_r 45 inches +, brown cherty Boyle limestone of the Devonian geologic period.

In places the A_p horizon is dark grayish brown (10YR 4/2), the B_g horizon is dominantly grayish brown (10YR 5/2) and has a texture of silty clay loam, and the fragipan is light brownish gray (10YR 6/2). Depth to the fragipan ranges from 12 to 24 inches, in many places within short distances. The content of chert in the fragipan ranges from 0 to 90 percent.

Mapped with this soil is a small acreage in which the surface layer is a very dark grayish-brown (10YR 3/2) silty clay loam and overlies a gleyed layer.

Guthrie silt loam is very wet; water stands on the surface after heavy rains, and tile drainage is generally not feasible. The root zone is shallow over the fragipan. The moisture-supplying capacity is moderately low, and natural fertility is low. Permeability is moderate above the fragipan, and the content of organic matter is low. The soil is easy to till. (Capability unit IVw-1.)

Hagerstown Series

The Hagerstown series consists of deep, well-drained soils on broad flats in the uplands. In areas that are not eroded, the surface layer is a thick, dark-brown silt loam and overlies a subsoil of reddish-brown silty clay loam. Below the subsoil is yellowish-red silty clay or clay. These soils developed in material weathered from limestone, but they are naturally acid as the result of leaching. They are nearly level to strongly sloping.

In some places these soils are associated with the moderately well drained Bedford, the somewhat poorly drained Lawrence, and the poorly drained Guthrie soils, but they are better drained than any of those soils. Also, they lack a fragipan and are at a slightly higher elevation or have stronger slopes. In some places the Hagerstown soils are associated with the Fleming soils. They differ from the Fleming soils in that they formed entirely in material weathered from limestone. The upper part of the profile in the Fleming soils formed in material weathered from limestone, and the lower part, in material weathered from clay shale.

The Hagerstown soils are southwest of Owingsville in the area called the Outer Bluegrass. They are among the most productive soils in the county. All of the acreage has been cleared and is used for row crops, pasture, or hay.

Hagerstown cherty silt loam, 6 to 12 percent slopes, eroded (HaC2).—This well-drained soil has a reddish subsoil. The soil developed in material weathered from limestone. The following describes a profile in a moist field:

A_p 0 to 6 inches, dark reddish-brown (5YR 3/2) cherty silt loam; moderate, fine, granular structure; friable; medium acid; clear, smooth boundary. 5 to 9 inches thick.

B_{21} 6 to 16 inches, reddish-brown (5YR 4/4) cherty silty clay loam or silty clay; strong, fine, angular blocky structure; thin clay films; firm, slightly sticky and plastic; strongly acid; clear, smooth boundary. 4 to 9 inches thick.

B_{22} 16 to 28 inches, yellowish-red (5YR 4/6) cherty clay; few, medium, distinct, brown (7.5YR 5/4) variegations; strong, medium, blocky structure; pronounced clay

films; very firm, sticky and plastic; medium acid; gradual, smooth boundary. 11 to 16 inches thick.

C_1 28 to 36 inches, yellowish-red (5YR 5/6) clay; many, fine, faint variegations of strong brown (7.5YR 5/8); massive; very firm, very sticky and plastic; common, small, hard, black concretions of irregular shape; medium acid; gradual, smooth boundary. 6 to 12 inches thick.

D_r 36 inches +, Boyle limestone of the Devonian geologic period.

Mapped with this soil is a small acreage of a Fleming cherty silt loam that has slopes of 2 to 6 percent, small areas in which the soil is not eroded and the plow layer is dark-brown (10YR 3/3 to 7.5YR 3/2) cherty silt loam, and a small acreage in which the soil is severely eroded and the surface layer is reddish-brown silty clay loam.

For Hagerstown cherty silt loam, 6 to 12 percent slopes, eroded, the hazard of further erosion is moderate. The root zone is moderately deep, and the moisture-supplying capacity is moderately high. The soil is high in natural fertility and is moderate in permeability. The content of organic matter is medium to low. Tillage is somewhat difficult because of the chert. (Capability unit IIIe-5.)

Hagerstown silt loam, 0 to 2 percent slopes (HgA).—This deep, well-drained soil of uplands has a reddish subsoil. The soil formed in material weathered from limestone. The following describes a profile in a moist field along a gravel road 0.4 of a mile northwest of Kendall Springs:

A_p 0 to 8 inches, dark-brown (10YR 3/3 to 7.5YR 3/2) silt loam; moderate, very fine and fine, granular structure; very friable; slightly acid; clear, smooth boundary. 6 to 9 inches thick.

A_3 8 to 12 inches, dark-brown (7.5YR 4/4) silt loam; weak, fine, granular and subangular blocky structure; very friable; very strongly acid; abrupt, smooth boundary. 3 to 5 inches thick.

B_1 12 to 20 inches, reddish-brown (5YR 4/4) silty clay loam; moderate, fine and medium, subangular blocky structure; patchy clay films; friable to firm, slightly sticky; few, small, very dark gray concretions; very strongly acid; clear, smooth boundary. 7 to 10 inches thick.

B_2 20 to 32 inches, yellowish-red (5YR 5/6) silty clay; moderate to strong, medium, subangular blocky structure; prominent clay films; firm, slightly plastic and slightly sticky; common, small, very dark gray concretions; very strongly acid; clear, smooth boundary. 10 to 14 inches thick.

B_3 32 to 45 inches, yellowish-red (5YR 4/6 to 5/8) silty clay; moderate to strong, medium, blocky structure; weak clay films; firm, sticky, plastic; small, very dark gray concretions; very strongly acid; gradual, smooth boundary. 8 to 15 inches thick.

C 45 to 52 inches, red (2.5YR 4/8) clay with variegations of light brown (7.5YR 6/4) and very dark gray (5YR 3/1); moderate, medium and coarse, blocky structure; very firm, sticky and plastic; few, small fragments of chert that are more numerous with increasing depth; very strongly acid; gradual, smooth boundary. 6 to 12 inches thick.

D_r 52 inches +, brown cherty Boyle limestone of the Devonian geologic period.

In some places the B_1 and B_2 horizons are red (2.5YR 5/6). Depth to the C horizon ranges from about 36 to 48 inches. In some places weathering has caused all of the limestone to disappear and the C horizon rests directly on gray clay shale, which is at a depth of about 5 feet. To a depth of at least 40 inches, there is no evidence of the profile having formed in material weathered from clay shale.

Mapped with this soil is a small acreage of a well drained to moderately well drained soil that has a surface layer similar to that described for Hagerstown silt loam, 0 to 2 percent slopes. The included soil differs from the typical Hagerstown soil in that it has a fragipan at a depth of about 28 inches.

For Hagerstown silt loam, 0 to 2 percent slopes, there is no hazard of erosion. This soil is not wet. Its root zone is deep, and the moisture supplying capacity is very high. Natural fertility is high. Permeability is moderate, and the content of organic matter is medium. The soil is easy to till. (Capability unit I-3.)

Hagerstown silt loam, 2 to 6 percent slopes (HgB).—This deep, well-drained soil of uplands has a reddish subsoil. Although it has stronger slopes than Hagerstown silt loam, 0 to 2 percent slopes, its profile is similar.

Mapped with this soil is a small acreage in which the soil is eroded and the plow layer, in most places, is dark-brown (7.5YR 4/4) silt loam. Also included is a small acreage of a Fleming silt loam that has slopes of 2 to 6 percent and a small acreage of a well drained to moderately well drained soil that has a fragipan at a depth of about 28 inches.

For Hagerstown silt loam, 2 to 6 percent slopes, the hazard of erosion is moderately low. The root zone is deep, and the moisture-supplying capacity is very high. The soil is high in natural fertility and has moderate permeability. The content of organic matter is medium, and the soil is easy to till. (Capability unit IIe-1.)

Hagerstown silt loam, 6 to 12 percent slopes, eroded (HgC2).—This deep, well-drained soil has a reddish subsoil. The soil formed in material weathered from limestone. Its profile is similar to that of Hagerstown silt loam, 0 to 2 percent slopes. The plow layer is dominantly dark brown (7.5YR 4/4) silt loam, however, and is only 4 to 6 inches thick.

Mapped with this soil is a small acreage that is not eroded. Also included is another small acreage in which the soil is severely eroded and the plow layer in most places is reddish-brown (5YR 4/4) silty clay loam.

For Hagerstown silt loam, 6 to 12 percent slopes, eroded, the hazard of further erosion is moderate. The root zone is deep, and the moisture-supplying capacity is very high. This soil is high in natural fertility and has moderate permeability. Its content of organic matter is medium to low. The soil is easy to till. (Capability unit IIIe-1).

Hagerstown silt loam, 12 to 20 percent slopes, eroded (HgD2).—This deep, well-drained soil of the uplands developed in material weathered from limestone. The profile is similar to the one described for Hagerstown silt loam, 0 to 2 percent slopes. It differs, however, in that the surface layer, in most places, is dark-brown (7.5YR 4/4) silt loam and is only 4 to 6 inches thick.

Mapped with this soil is a small acreage that is not eroded. Also included is a small acreage in which the soil is severely eroded and the plow layer in most places is reddish-brown (5YR 4/4) silty clay loam.

For Hagerstown silt loam, 12 to 20 percent slopes, eroded, the hazard of further erosion is moderately high. The root zone is deep, and the moisture-supplying capacity is very high. The soil is high in natural fertility and has moderate permeability. Its content of organic matter is medium to low. This soil is easy to cultivate, but the

strong slopes make farm machinery difficult to use. (Capability unit IVe–1.)

Huntington Series

The Huntington series consists of deep to shallow, well-drained to somewhat excessively drained soils that are nearly neutral. The soils are on first bottoms. Their surface layer, a dark-brown to very dark grayish-brown silt loam, overlies a C horizon of brown to dark yellowish-brown silt loam. The soils formed in recent alluvium washed from soils that developed in material weathered from limestone.

These soils occur in association with the moderately well drained Lindside, somewhat poorly drained Newark, and poorly drained Melvin soils. They are better drained than any of the associated soils.

The Huntington soils are along streams in the part of the county that is underlain by limestone. They are among the most productive soils in the county. Nearly all of the acreage has been cleared and is now in row crops, hay, or pasture. Corn grown on these soils usually makes high yields, but the soils are generally not used for tobacco because of the danger of overflow.

Huntington silt loam (0 to 2 percent slopes) (Hs).—This is a well-drained, nearly neutral soil of first bottoms. The following describes a profile in a moist field along Highway 36, 2.2 miles southeast of Owingsville:

A_p 0 to 9 inches, dark-brown to very dark grayish-brown (10YR 3/3 to 3/2) silt loam; moderate, fine, crumb structure; friable; slightly acid; clear, smooth boundary. 5 to 11 inches thick.

C_1 9 to 33 inches, dark-brown (10YR 4/3 to 3/3) to dark yellowish-brown (10YR 4/4) silt loam; moderate, fine and medium, granular structure; friable; few, small, scattered, black concretions; mildly alkaline; clear, smooth boundary. 18 to 28 inches thick.

C_2 33 to 54 inches, brown (10YR 4/3) to dark yellowish-brown (10YR 4/4) fine silt loam; a few, fine, faint mottles of pale brown (10YR 6/3); moderate, medium, granular structure; friable; numerous, small, black, round concretions; slightly alkaline. 15 to 40 inches thick.

This soil ranges from slightly acid to mildly alkaline in reaction. In a few places the C horizons have a texture of silty clay loam. The C_2 horizon has faint mottles in some places, but in other places it is free of mottling. Depth to bedrock ranges from 3 to more than 10 feet.

Mapped with this soil is a small acreage in which the slope is stronger than 2 percent, another small acreage in which the soil is moderately deep (28 to 36 inches), and still another small acreage in which the soil is similar to the Huntington soil described but formed in local alluvium. In addition, a small acreage of an Ashton silt loam on low terraces is included. Unlike the Huntington soil, the Ashton soil has a B horizon.

For Huntington silt loam, there is no hazard of erosion. The root zone is deep, and the moisture-supplying capacity is very high. The soil is high in natural fertility and is easy to till. Permeability is moderately rapid, and the content of organic matter is medium. (Capability unit I–1.)

Huntington gravelly silt loam (0 to 2 percent slopes) (Hn).—This is a well-drained to somewhat excessively drained, nearly neutral soil of first bottoms. Its profile is similar to that of Huntington silt loam, but 20 to 30 percent of the soil material consists of gravel.

Mapped with this soil are a few small areas in which the texture of the surface layer is gravelly silty clay loam.

For Huntington gravelly silt loam, there is no hazard of erosion. The root zone is deep, and the moisture-supplying capacity is high. The soil is high in natural fertility, but it is somewhat difficult to till because of the content of gravel. Permeability is moderately rapid, and the content of organic matter is medium. (Capability unit IIs–1.)

Huntington stony silt loam, shallow (0 to 2 percent slopes) (Hu).—This well-drained to somewhat excessively drained soil is moderately deep and is nearly neutral. The soil is on first bottoms. Its profile is similar to that described for Huntington silt loam, but it differs in that 20 to 50 percent of the soil material consists of stones and gravel. In most places the depth to bedrock is between 24 and 36 inches.

Mapped with this soil is a small acreage of stony alluvial land.

For Huntington stony silt loam, shallow, there is no hazard of erosion. The root zone is moderately deep to shallow over bedrock, and the moisture-supplying capacity is moderately high. The soil is high in natural fertility. Tillage is difficult. Because of the stones, farm machinery can be used to only a limited extent. Permeability is moderately rapid, and the content of organic matter is medium. (Capability unit Vs–1.)

Jefferson Series

The Jefferson series consists of deep, well-drained soils on toe slopes and alluvial fans. In areas that are not eroded, the surface layer is very dark grayish-brown to yellowish-brown gravelly silt loam. The subsoil is yellowish-brown gravelly silt loam and silty clay loam. These soils formed in local alluvium. The material in which they formed washed mainly from soils that developed in material weathered from acid sandstone and shale. The soils are naturally acid. They are sloping to strongly sloping.

These soils are in positions below those occupied by the Muskingum soils, and they formed partly in material washed from those soils. They are somewhat similar to the Muskingum soils, but they are deeper and have a more developed B horizon. In places the Jefferson soils are associated with the Muse soils, which are also on toe slopes. They differ from the Muse soils in that they have a gravelly, coarse-textured, yellowish subsoil and have been much less influenced by shale.

The Jefferson soils are in the valleys of streams in the mountainous southeastern part of the county. Only a small part of the acreage has been cleared and is used for hay crops or pasture.

Jefferson gravelly silt loam, 2 to 12 percent slopes (JeC).—This deep, well-drained soil developed in material derived from acid sandstone and shale. It is on toe slopes and alluvial fans. In most places the slope is between 6 and 10 percent. The following describes a profile in a moist field in woods along Clark Fork road, one-half mile east of the junction with Mill Creek road:

A_0 ½ inch to 0, partly decomposed leaves and twigs.

A_1 0 to 3 inches, very dark grayish-brown (10YR 3/2) to dark grayish-brown (10YR 4/2) gravelly silt loam; weak, fine, granular structure; very friable; very

strongly acid; clear, smooth boundary. 1 to 4 inches thick.

A_2 3 to 8 inches, yellowish-brown (10YR 5/4) gravelly silt loam; weak, fine, granular and weak, fine, subangular blocky structure; friable; very strongly acid; clear, smooth boundary. 3 to 6 inches thick.

B_1 8 to 18 inches, yellowish-brown (10YR 5/6) gravelly silt loam; weak to moderate, fine and medium, subangular blocky structure; friable; very strongly acid; clear, smooth boundary. 8 to 12 inches thick.

B_2 18 to 32 inches, yellowish-brown (10YR 5/6) gravelly silty clay loam; moderate, medium, blocky structure; friable; very strongly acid; gradual, smooth boundary. 10 to 16 inches thick.

B_3 32 to 48 inches +, light olive-brown (2.5Y 5/6) gravelly silty clay loam; a few, fine, faint variegations of light yellowish brown (2.5Y 6/4); moderate, medium and coarse, blocky structure; firm; very strongly acid.

The deposit of local alluvium in which this soil formed ranges from 3 to more than 6 feet in thickness. In places the B_1 horizon is absent, and in some places it is light yellowish brown (2.5Y 6/4). The B_2 horizon ranges from gravelly silty clay loam to silt loam.

Mapped with this soil is a small acreage that is free of gravel. Also included is a small acreage in which the soil is eroded and the plow layer is yellowish brown (10YR 5/4).

For Jefferson gravelly silt loam, 2 to 12 percent slopes, the hazard of erosion is moderate. The root zone is deep, and the moisture-supplying capacity is high. The soil is moderately low in natural fertility, but the supply of plant nutrients is easy to build up. Permeability is moderately rapid, and the content of organic matter is low. Tillage is somewhat difficult because of the content of gravel. (Capability unit IIIe-5.)

Jefferson gravelly silt loam, 12 to 20 percent slopes (JeD).—This deep, well-drained soil is on toe slopes. Its profile is similar to that of Jefferson gravelly silt loam, 2 to 12 percent slopes, but this soil has stronger slopes.

Mapped with this soil are small areas of a soil that has a reddish-brown subsoil, another small acreage in which the soil is free of gravel, and still another small acreage in which the soil is eroded. In the eroded areas the plow layer is yellowish-brown (10YR 5/4) silt loam and is 4 to 6 inches thick.

For Jefferson gravelly silt loam, 12 to 20 percent slopes, the hazard of erosion is moderately high. The root zone is deep, and the moisture-supplying capacity is high. The soil is moderately low in natural fertility, but the supply of plant nutrients is easy to build up. Permeability is moderately rapid, and the content of organic matter is low. The soil is easy to till, but the strong slopes make the use of farm machinery difficult. (Capability unit IVe-2.)

Johnsburg Series

The Johnsburg series consists of somewhat poorly drained soils that have a fragipan. The soils are on uplands. In areas that are not eroded, the surface layer is dark-gray to dark grayish-brown silt loam and overlies a subsoil of mottled yellow and yellowish-brown silt loam. The fragipan is at a depth of about 18 inches. In some places these soils developed in material weathered from clay shale and interbedded siltstone. In other places they developed in local alluvium consisting of varying proportions of material weathered from clay shale and siltstone. The soils are naturally acid and are nearly level to strongly sloping.

These soils commonly adjoin or are near areas of Cavode, Mullins, Rarden, Rockcastle, and Tilsit soils on the uplands, and they are near areas of Cavode soils on the toe slopes. The Johnsburg soils have a coarser textured subsoil than the Cavode soils, which have no fragipan or only a very weak fragipan. They are better drained than the Mullins soil and are more poorly drained than the other associated soils. All of the associated soils formed in material weathered from clay shale intermixed with material weathered from the interbedded siltstone.

In this county the Johnsburg soils were not mapped separately but were mapped in undifferentiated units with the Cavode soils. Information about the Cavode soils can be found under the Cavode series. A representative profile of the Cavode soils is described under Johnsburg and Cavode silt loams, 0 to 2 percent slopes. The Johnsburg and Cavode silt loams are southeast of Owingsville in the area called the Knobs. Most of the acreage has been cleared. It is used mainly for hay or pasture, but some row crops are grown.

Johnsburg and Cavode silt loams, 0 to 2 percent slopes (JoA).—These somewhat poorly drained soils are on uplands and toe slopes. The areas are so intermingled that it was not practical to map them separately. The Johnsburg soil has a fragipan; the Cavode soil has a finer textured subsoil than the Johnsburg soil, but it has no fragipan or only a very weak fragipan.

The Cavode soil occurs within areas of the Johnsburg soil, and it is less extensive than the Johnsburg soil. The following describes a profile of a Johnsburg silt loam in a moist field along Highway No. 36, 0.2 of a mile north of Olympia:

A_1 0 to 3 inches, dark-gray (10YR 4/1) to dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; very friable; strongly acid; clear, smooth boundary. 1 to 4 inches thick.

A_2 3 to 8 inches, light yellowish-brown (10YR 6/4) silt loam; weak, fine, subangular blocky and fine, granular structure; very friable; strongly acid; clear, smooth boundary. 3 to 7 inches thick.

B_1 8 to 13 inches, yellow (10YR 7/6) to light yellowish-brown (10YR 6/4) light silty clay loam; common, fine, faint mottles of pale yellow (2.5Y 7/4) and pale brown (10YR 6/3); weak, fine, blocky structure; friable; very strongly acid; gradual, smooth boundary. 3 to 7 inches thick.

B_2 13 to 18 inches, light yellowish-brown (2.5Y 6/4) silty clay loam; many, distinct, fine and medium mottles of yellowish brown (10YR 5/6) and light gray (10YR 7/2); moderate, medium, blocky structure; slightly compact in place; very strongly acid; gradual, smooth boundary. 4 to 12 inches thick.

B_{3m1} 18 to 25 inches, light-gray (10YR 7/2) to light brownish-gray (2.5Y 6/2) fine silt loam or silty clay loam; common, fine, distinct mottles of brownish yellow (10YR 6/6), yellowish brown (10YR 5/6), and strong brown (7.5YR 5/6); massive; compact in place and brittle if fractured; very strongly acid; gradual, smooth boundary. 5 to 8 inches thick.

B_{3m2} 25 to 40 inches, very pale brown (10YR 7/4) to light yellowish-brown (10YR 6/4) silty clay loam; many, fine, distinct mottles of light gray (2.5Y 7/2); weak, irregular, coarse, columnar structure that breaks to weak, coarse, blocky; firm, very compact and brittle; extremely acid; gradual, smooth boundary. 10 to 20 inches thick.

C 40 to 47 inches, variegated light olive-brown (2.5Y 5/4), olive-yellow (5Y 6/6), and light-gray (5Y 7/1) silty clay; massive; firm, sticky and plastic; thin frag-

ments of weathered shale; strongly acid; gradual, smooth boundary. 6 to 30 inches thick.

D_r 47 inches, olive (5Y 5/3 to 5/4), acid shale.

In some places the B_1 horizon is silt loam. In places the B_2 horizon is light olive brown (2.5Y 5/6) or yellow (2.5Y 7/6) and is mottled. In wooded areas the A horizons have a weak, thick, platy structure. In some areas the underlying shale is alkaline or weakly calcareous, but it is at a great enough depth that the reaction of the solum is not affected. Depth to the fragipan ranges from 16 to 20 inches. The fragipan ranges from 10 to 40 inches in thickness.

The following describes a profile of a Cavode silt loam in a moist field 1 mile south of U.S. Highway No. 60 along a gravel road:

A_p 0 to 7 inches, dark grayish-brown (10YR 4/2 to 2.5Y 4/2) silt loam; weak, fine and medium, granular structure; friable; slightly acid; clear, smooth boundary. 5 to 8 inches thick.

B_1 7 to 11 inches, olive-brown (2.5Y 4/4) silty clay loam; few, medium, faint mottles of light brownish gray (2.5Y 6/2); weak, fine, subangular blocky structure; firm; slightly sticky and slightly plastic; medium acid; gradual, smooth boundary. 3 to 5 inches thick.

B_2 11 to 19 inches, light olive-brown (2.5Y 5/4) silty clay or clay; common, fine, faint mottles of light yellowish brown (2.5Y 6/4), yellowish brown (10YR 5/8), and light brownish gray (2.5Y 6/2); strong to moderate, fine, angular blocky structure; noticeable clay skins on the surfaces of peds; very sticky and very plastic; strongly acid; gradual, wavy boundary. 6 to 10 inches thick.

C 19 to 28 inches, olive (5Y 5/3) clay; common, fine, faint mottles of light olive brown (2.5Y 5/4) and olive gray (5Y 5/2); massive; very firm, very sticky and very plastic; strongly acid; gradual, wavy boundary. 8 to 10 inches thick.

D_r 28 inches +, slightly weathered, acid clay shale.

In places the B_1 horizon lacks mottling and the color of the B_2 horizon ranges to light yellowish brown (2.5Y 6/4). Depth to the D_r horizon ranges from 26 to 42 inches.

The soils in this undifferentiated unit are moderately wet; water stands in the depressions after heavy rains, and tile drainage is not feasible. The root zone is shallow over the fragipan or over clay, and the moisture-supplying capacity is moderately high. Natural fertility is low, but the supply of plant nutrients is fairly easy to build up. The soils have moderate permeability above the fragipan or layer of clay, and they are low in content of organic matter. The soils are easy to till. (Capability unit IIIw-1; woodland suitability group 9.)

Johnsburg and Cavode silt loams, 2 to 6 percent slopes (JoB).—These soils are dominantly somewhat poorly drained. The Johnsburg soil, which is more extensive than the Cavode, has a fragipan and the Cavode soil has a fine-textured subsoil and no fragipan. The profiles of these soils are similar to the profiles described under Johnsburg and Cavode silt loams, 0 to 2 percent slopes, as representative of the Johnsburg and Cavode soils. These soils are slightly better drained, however, than the less sloping Johnsburg and Cavode silt loams.

For these soils, the hazard of erosion is moderately low. The soils are moderately wet, but tile drainage is not feasible. The root zone is shallow over the fragipan or clay, and the moisture-supplying capacity is moderately high. Natural fertility is low, but the supply of plant nutrients is fairly easy to build up. Permeability is moderate above the fragipan or layer of clay, and the content of organic matter is low. These soils are easy to till. (Capability unit IIIw-3; woodland suitability group 7.)

Johnsburg and Cavode silt loams, 6 to 12 percent slopes (JoC).—The soils in this undifferentiated unit are somewhat poorly drained. They differ in that the Johnsburg soil has a fragipan and the Cavode soil has a fine-textured subsoil and no fragipan. These soils have stronger slopes and are slightly better drained than Johnsburg and Cavode silt loams, 0 to 2 percent slopes. Their profiles are similar, however, except that the Johnsburg soil in this undifferentiated unit contains only a weak fragipan. The Cavode soil is mainly on toe slopes.

For these soils, the hazard of erosion is moderately high. The soils are slightly wet to moderately wet, but tile drainage is not feasible. The root zone is shallow over the fragipan or clay, and the moisture-supplying capacity is moderately high. The soils are low in natural fertility, but the supply of plant nutrients is fairly easy to build up. Permeability is moderate above the fragipan or clay, and the content of organic matter is low. The soils are easy to till. (Capability unit IVe-8; woodland suitability group 7.)

Johnsburg and Cavode silt loams, 6 to 12 percent slopes, eroded (JoC2).—The profiles of these soils are similar to those described for Johnsburg and Cavode silt loams, 0 to 2 percent slopes, but the plow layer is mainly mixed dark-gray (10YR 4/1), light yellowish-brown (10YR 6/4), and yellow (10YR 7/6) silt loam with silty clay loam in spots. Also the Johnsburg soil has only a weak fragipan, and depth to the pan or C horizon ranges from about 12 to 16 inches. The soils are somewhat poorly drained.

For these soils, the hazard of further erosion is moderately high. The soils are slightly wet to moderately wet, but tile drainage is not feasible. The root zone is shallow over the fragipan or clay. The moisture-supplying capacity is moderately low, and the soil is low in natural fertility. Permeability is moderate above the fragipan or clay, and the content of organic matter is very low. The soils are easy to till. (Capability unit IVe-8; woodland suitability group 7.)

Landisburg Series

The Landisburg series consists of moderately well drained to somewhat poorly drained soils on toe slopes or alluvial fans. The soils have a fragipan. Their surface layer, a dark grayish-brown to dark yellowish-brown cherty silt loam, overlies a subsoil of light yellowish-brown cherty silt loam. Below the subsoil, at a depth of about 16 inches, is the fragipan. These soils developed in local alluvium washed from soils that formed in material weathered from cherty limestone and shale. They are naturally acid and are gently sloping to sloping.

These soils occur in association with the well-drained Fleming and the poorly drained Purdy soils. They are in positions below the Fleming soils, are less well drained and coarser textured than those soils, and have a fragipan. The Landisburg soils are in positions above the Purdy soil, which is on stream terraces, and they are cherty and are better drained than that soil. Also, the Purdy soil formed in general alluvium.

644-670—63——3

All of the acreage of Landisburg soils has been cleared. The soils are used mainly for pasture, but occasionally a row crop is grown.

Landisburg cherty silt loam, 2 to 12 percent slopes (LaB).—This is the only Landisburg soil in the county. It is moderately well drained to somewhat poorly drained. This soil is on toe slopes near Preston, and it formed in alluvium washed from soils that developed in material weathered from cherty limestone and shale. The following describes a profile in a moist field along Stulltown Road (State Highway No. 965), 0.5 of a mile south of Preston at the junction of Highway No. 1331:

A_p 0 to 6 inches, dark grayish-brown (10YR 4/2) to dark yellowish-brown (10YR 4/4) cherty silt loam; weak, fine, granular structure; very friable; clear, wavy boundary. 3 to 7 inches thick.

A_2 6 to 10 inches, light yellowish-brown (2.5Y 6/4) cherty silt loam; streaks of dark grayish-brown (10YR 4/2) material from layer above; weak, fine, granular structure; very friable; very strongly acid; clear smooth boundary. 3 to 6 inches thick.

B_2 10 to 16 inches, light yellowish-brown (2.5Y 6/4) cherty silt loam; fine to medium mottles of light gray (10YR 7/1) and a few, fine, faint mottles of yellowish brown (10YR 5/6); weak, fine, subangular and weak, thin, platy structure; friable; very strongly acid; clear, wavy boundary. 4 to 8 inches thick.

B_{3m1} 16 to 28 inches, light yellowish-brown (2.5Y 6/4) very cherty silt loam; common, medium and coarse, distinct mottles of light gray (10YR 7/1) and a few, fine, distinct mottles of yellowish brown (10YR 5/6); massive to weak, medium, blocky structure; firm, compact, and brittle; very strongly acid; clear, wavy boundary. 10 to 14 inches thick.

B_{3m2} 28 to 48 inches +, mottled very cherty silty clay loam; mottles are common, medium, and distinct, and are yellowish brown (2.5Y 6/4), light gray (10YR 7/1), and yellowish red (5YR 4/6); massive; firm, very compact in place; common black concretions as large as 1 inch in diameter and black manganese stains; very strongly acid.

In some places the B_2 horizon is light brownish yellow (10YR 6/4) mottled with light brownish gray and yellowish brown.

Mapped with this soil are a few small areas in which the soil is free of chert and small areas in which the soil is eroded and has a surface layer of light yellowish-brown (2.5Y 6/4) silt loam. Also included is a small acreage in which drainage is better than that of the normal soil.

For Landisburg cherty silt loam, 2 to 12 percent slopes, the hazard of erosion is moderate to moderately high. The soil is slightly wet to moderately wet, but tile drainage is not feasible. The root zone is shallow over the fragipan, and the moisture-supplying capacity is moderately low. The soil is low in natural fertility, but the supply of plant nutrients is fairly easy to build up. Permeability is moderate above the fragipan. The content of organic matter is low. Tillage is somewhat difficult because of the chert. (Capability unit IIIe-15.)

Lawrence Series

The Lawrence series consists of somewhat poorly drained soils on broad flats in the uplands. The soils have a fragipan. In areas that are not eroded, they have a surface layer of very dark grayish-brown or dark yellowish-brown silt loam and a subsoil of mottled light yellowish-brown silt loam. The fragipan is at a depth of about 20 inches. These soils developed in material weathered from limestone, but they are naturally acid as the result of leaching. Their slope ranges from 0 to 2 percent.

The Lawrence soils are associated with the well drained Hagerstown, the moderately well drained Bedford, and the poorly drained Guthrie soils. They are less well drained than the Hagerstown and Bedford soils, but they are better drained than the Guthrie soil.

Nearly all of the acreage of Lawrence soils has been cleared. The soils are used mainly for hay or pasture, but some corn is grown.

Lawrence silt loam (0 to 2 percent slopes) (Lc).—This is the only Lawrence soil mapped in the county. It is mainly southeast of Owingsville in the area called the Outer Bluegrass. The soil is somewhat poorly drained and has a fragipan. The following describes a profile in a moist field along a gravel road 0.1 of a mile south of Peeled Oak:

A_1 0 to 3 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine, granular structure; friable; medium acid; clear, smooth boundary. 2 to 4 inches thick.

A_2 3 to 9 inches, dark yellowish-brown (10YR 4/4) silt loam; weak to moderate, fine, granular structure; friable; few, small, black, rounded, hard concretions; strongly acid; abrupt, smooth boundary. 4 to 8 inches thick.

B_1 9 to 15 inches, light yellowish-brown (10YR 6/4) silt loam; a few, fine, faint mottles of light brownish gray (10YR 6/2); moderate, medium, subangular blocky structure; firm; strongly acid; gradual, smooth boundary. 4 to 9 inches thick.

B_2 15 to 20 inches, light yellowish-brown (10YR 6/4) fine silt loam; common, fine and medium, faint mottles of very pale brown (10YR 7/3) and brownish gray (10YR 6/2); moderate, fine and medium, blocky structure; firm, slightly compact in place; strongly acid; few, soft, brown concretions of irregular shape; abrupt, smooth boundary. 4 to 8 inches thick.

B_{3mg} 20 to 40 inches, mottled light yellowish-brown (10YR 6/4), yellowish-brown (10YR 5/6), and light-gray (10YR 7/1) silty clay loam; many, medium, distinct mottles; massive to weak, coarse, blocky structure; firm, compact in place, slightly plastic; few, soft, brown and black concretions as much as one-fourth inch in diameter; very strongly acid; gradual, smooth boundary. 10 to 30 inches thick.

C_g 40 to 49 inches, mottled light yellowish-brown (10YR 6/4), gray (10YR 5/1), and light-gray (10YR 7/1) silty clay loam; mottles are many, medium, and distinct; massive to weak, coarse, blocky structure; firm, compact in place, slightly plastic; many, soft, black and dark-brown concretions, one-half inch in diameter; fragments of chert that become larger and more numerous with increasing depth; very strongly acid; gradual, smooth boundary. 5 to 11 inches thick.

D_r 49 inches +, cherty, brown Boyle limestone of the Devonian geologic period.

In some places the B_2 horizon is mottled light yellowish brown and light brownish gray (2.5Y 6/2). Depth to mottling ranges from 6 to 13 inches. The fragipan is at a depth of 16 to 24 inches, and bedrock is at a depth of 4 to 6 feet.

This soil is moderately wet. Water stands in the depressions after heavy rains, and tile drainage is not feasible. The root zone is moderately deep to shallow over the fragipan, and the moisture-supplying capacity is moderately high. Natural fertility is moderately low. The supply of plant nutrients is fairly easy to build up, however, and the soil is easy to till. Permeability is moderate above the fragipan. The content of organic matter is low. (Capability unit IIIw-1.)

Lindside Series

The Lindside series consists of deep, moderately well drained, nearly neutral soils of first bottoms. The surface layer, a dark-brown silt loam, overlies a subsoil of dark yellowish-brown or brown silt loam to silty clay loam. The subsoil is mottled below a depth of about 20 to 24 inches. These soils formed in recent alluvium. The alluvium washed from soils that developed in material weathered from limestone.

These soils are associated with the well-drained Huntington, the somewhat poorly drained Newark, and the poorly drained Melvin soils. They are less well drained than the Huntington soils, but they are better drained than the Newark and Melvin soils.

The Lindside soils are very productive. Nearly all of the acreage has been cleared and is now in field crops, pasture, or hay crops of good quality. Where the soil is used to grow corn, high yields are obtained, but tobacco is generally not grown because of the hazard of flooding.

Lindside silt loam (0 to 2 percent slopes) (Ld).—This is the only Lindside soil mapped in the county. It is on first bottoms along streams in the part of the county underlain by limestone. The soil is moderately well drained and is nearly neutral. The following describes a profile in a moist field along Highway No. 111, 1.7 miles north of Slate Valley:

A_p 0 to 10 inches, dark-brown (10YR 3/3) to brown (10YR 4/3) silt loam; fine and medium, crumb structure; friable; neutral; clear, smooth boundary. 6 to 12 inches thick.

C_1 10 to 22 inches, brown (10YR 4/3) to dark yellowish-brown (10YR 4/4) silt loam; medium, fine and medium, granular structure; friable; neutral; abrupt, smooth boundary. 9 to 15 inches thick.

C_2 22 to 48 inches +, brown to dark-brown (10YR 4/3) silty clay loam; many, fine and medium, faint mottles of yellowish brown (10YR 5/6) and light brownish gray (10YR 6/2); weak, fine and medium, granular structure; firm, slightly compact in place, slightly sticky and slightly plastic; neutral to mildly alkaline.

This soil ranges from slightly acid to mildly alkaline in reaction. The C layers range from silt loam to silty clay loam in texture. In some places the C_2 horizon is grayish brown (10YR 5/2).

Mapped with this soil are small areas of a soil formed in local alluvium.

For Lindside silt loam, there is no hazard of erosion. This soil is slightly wet, but drainage can be improved by tile. The root zone is deep, and the moisture-supplying capacity is very high. This soil is high in natural fertility and is easy to till. Permeability is moderate, and the content of organic matter is medium. (Capability unit I-2.)

Lowell Series

The Lowell series consists of deep, well-drained to somewhat excessively drained soils of uplands. In areas that are not eroded, the surface layer is a thick, very dark grayish-brown to dark-brown silt loam that overlies yellowish-brown silty clay. Below the silty clay is light olive-brown clay, which is at a depth of about 30 inches. These soils developed in material weathered from limestone or interbedded siltstone and limestone. They are naturally acid, and their slope ranges from gentle to strong.

These soils are associated with the Shelbyville, Fairmount, and Eden soils. Their subsoil is finer textured and more yellowish than that of the Shelbyville soils, and they lack the prominent concretionary zone that is typical of those soils. The Lowell soils are not flaggy, and they are more nearly level, are much deeper, and have a more developed profile than the Fairmount soils. They are on ridgetops above the Eden soils. The Lowell soils have a darker colored surface layer and more developed horizons than the Eden soils. They are also more acid.

The Lowell soils are in the part of the county, between Sharpsburg and Reynoldsville, called the Outer Bluegrass. They are among the most productive soils in the county. Most of the acreage has been cleared and is used for row crops or pasture.

Lowell silt loam, 2 to 6 percent slopes (LoB).—This is a deep, well-drained soil of uplands. It developed in material weathered from limestone or siltstone. Fine-textured material is in the lower part of the profile. The following describes a profile in a moist field, 1.2 miles southeast of Bethel:

A_{11} 0 to 3 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine and medium, crumb structure; very friable; medium acid; clear, smooth boundary. 2 to 4 inches thick.

A_{12} 3 to 12 inches, dark-brown (10YR 3/3) silt loam; moderate, medium, granular structure; friable; strongly acid; clear, smooth boundary. 6 to 10 inches thick.

B_1 12 to 16 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate, medium, blocky structure; thin clay skins on the faces of peds; firm, slightly plastic; common, small, black, concretions that are round and hard; strongly acid; abrupt, smooth boundary. 3 to 6 inches thick.

B_2 16 to 23 inches, yellowish-brown (10YR 5/4) silty clay; common, medium, faint variegations of dark yellowish brown (10YR 4/4) and few, fine, faint variegations of strong brown (7.5YR 5/6); moderate, medium; blocky structure; prominent clay films on the faces of peds; firm, plastic and sticky; common, small, black concretions that are round and hard; strongly acid; clear, smooth boundary. 5 to 10 inches thick.

B_3 23 to 30 inches, yellowish-brown (10YR 5/8) clay; common, fine, faint mottles of light yellowish brown (10 YR 6/4); weak, coarse, blocky structure; sticky and plastic; common, small, black concretions that are round and hard; very strongly acid; gradual, smooth boundary. 5 to 11 inches thick.

C 30 to 39 inches, light olive-brown (2.5Y 5/4) clay; common, fine, distinct variegations of yellowish brown (10YR 5/8); massive; very firm, sticky and very plastic; common, medium-sized, soft, black concretions of irregular shape; very strongly acid; 3 to 10 inches thick.

D_r 39 inches +, argillaceous, thin-bedded limestone of the Maysville or Richmond formations, Ordovician geologic period.

In some profiles there is a dark grayish-brown A_p horizon, about 8 inches thick, instead of the A_{11} and A_{12} horizons. In places the B_1 horizon is absent and the B_2 horizon is as much as 14 inches thick. In the areas where the B_1 horizon is absent, there is a B_{21} horizon of silty clay and a B_{22} horizon of clay. In places the B horizon is brown (7.5YR 4/4 to 5/6). In some places the D_r horizon consists of interbedded limestone and siltstone. Depth to bedrock ranges from 36 to about 48 inches. In a few places the soil is nearly level.

For Lowell silt loam, 2 to 6 percent slopes, the hazard of erosion is moderately low. The root zone is deep, and the moisture-supplying capacity is very high. The soil is high in natural fertility and is easy to till. Permeabil-

ity is moderately slow to slow in the lower horizons. The content of organic matter is medium. (Capability unit IIe-2.)

Lowell silt loam, 2 to 6 percent slopes, eroded (LoB2).—This deep, well-drained soil developed in material weathered from limestone or siltstone. Its profile is similar to that of Lowell silt loam, 2 to 6 percent slopes, but erosion has caused some material from the B horizon to be mixed with that in the A horizon. As a result, the present A_p horizon has mixed colors of dark brown (10YR 3/3) and dark yellowish brown (10YR 4/4) and a slightly finer texture than that in the uneroded soil.

For this soil, the hazard of further erosion is moderately low. The root zone is deep, and the moisture-supplying capacity is very high. The soil is high in natural fertility and is easy to till. Permeability is moderately slow to slow in the lower horizons. The content of organic matter is medium to low. (Capability unit IIe-2.)

Lowell silt loam, 6 to 12 percent slopes (LoC).—This soil is deep and well drained. It is on uplands and developed in material weathered from limestone or siltstone. This soil has stronger slopes than Lowell silt loam, 2 to 6 percent slopes, but its profile is similar. It has an A_p horizon, 6 to 8 inches thick, and a fine-textured subsoil.

For this soil, the hazard of erosion is moderate. The root zone is deep, and the moisture-supplying capacity is very high. The soil is high in natural fertility and is easy to till. Permeability is moderately slow to slow in the lower horizons. The content of organic matter is medium. (Capability unit IIIe-2.)

Lowell silt loam, 6 to 12 percent slopes, eroded (LoC2).—In this well-drained soil the subsoil is fine textured. The A horizon is thinner, lighter colored, and slightly finer textured than that of Lowell silt loam, 2 to 6 percent slopes, but otherwise the profile is similar. Depth to bedrock ranges from 28 to 38 inches.

Mapped with this soil is a small acreage in which erosion has been severe and in which the A_p horizon is dominantly dark yellowish-brown (10YR 4/4) silty clay loam. In places there are a few shallow gullies.

For Lowell silt loam, 6 to 12 percent slopes, eroded, the hazard of further erosion is moderate. The root zone is moderately deep to deep, and the moisture-supplying capacity is moderately high. The soil is high in natural fertility and is easy to till. Permeability is moderately slow to slow in the lower horizons. The content of organic matter is medium to low. (Capability unit IIIe-2.)

Lowell silt loam, 12 to 20 percent slopes, eroded (LoD2).—The A_p horizon of this well-drained soil of uplands is dominantly dark-brown (10YR 4/3) silt loam in which dark yellowish-brown (10 YR 4/4) silty clay loam is interspersed. Depth to bedrock ranges from 30 to 40 inches.

Mapped with this soil is a small acreage in which the soil is not eroded and the surface layer is like that of Lowell silt loam, 2 to 6 percent slopes.

For Lowell silt loam, 12 to 20 percent slopes, eroded, the hazard of further erosion is high. The root zone is moderately deep, and the moisture-supplying capacity is moderately high. Permeability is moderately slow to slow in the lower horizons. The content of organic matter is medium to low. The soil is easy to till, but the strong slope makes the use of farm machinery difficult. (Capability unit IVe-3.)

Lowell silty clay loam, 6 to 12 percent slopes, severely eroded (LpC3).—This moderately deep soil has developed in material weathered from limestone or siltstone. The profile is similar to that of Lowell silt loam, 2 to 6 percent slopes, but the plow layer is dominantly dark yellowish-brown (10YR 4/4) silty clay loam, and the B horizon is silty clay throughout. Also, depth to bedrock ranges from 20 to 30 inches. There are a few shallow gullies in places, and in a few places the plow layer has a texture of silty clay.

Mapped with this soil are a few areas in which the texture of the surface layer is silt loam. In these areas the B_1 horizon is thin and has a texture of silty clay loam.

For Lowell silty clay loam, 6 to 12 percent slopes, severely eroded, the hazard of further erosion is moderately high. The root zone is moderately deep over bedrock, and the moisture-supplying capacity is moderately low. The soil is moderately high in natural fertility, but it is somewhat difficult to till because of the moderately fine texture of the plow layer. Permeability is moderately slow to slow in the lower horizons. The content of organic matter is low to very low. (Capability unit IVe-11.)

Lowell silty clay loam, 12 to 20 percent slopes, severely eroded (LpD3).—This well-drained soil has a profile similar to that of Lowell silt loam, 2 to 6 percent slopes, except that in most places the plow layer is dark yellowish-brown (10YR 4/4) silty clay loam mixed with a smaller amount of dark-brown silt loam. Also, the upper part of the B horizon is silty clay that grades to clay in the lower part. Depth to bedrock ranges from 20 to 30 inches. In places there are a few shallow gullies.

For this soil, the hazard of further erosion is high. The root zone is moderately deep over bedrock, and the moisture-supplying capacity is moderately low. The soil is high in natural fertility. Permeability is moderately slow to slow in the lower horizons. The content of organic matter is low to very low. (Capability unit VIe-2.)

Lowell silty clay loam, shallow, 2 to 6 percent slopes, eroded (LrB2).—This well-drained soil has a yellowish-brown, clayey subsoil. The soil developed in material weathered from siltstone or limestone. The surface layer is thinner and finer textured than that of Lowell silt loam, 2 to 6 percent slopes, and the upper part of the subsoil is lighter colored. The following describes a profile in a moist field along Highway No. 1325, 0.9 of a mile northeast of Reynoldsville:

A_p 0 to 5 inches, dark grayish-brown (10YR 4/2) silty clay loam with pockets of yellowish brown (10YR 5/6); weak, medium, granular structure; friable to firm, slightly sticky and slightly plastic; numerous root hairs and many, small, round, black concretions; nearly neutral; abrupt, smooth boundary. 4 to 6 inches thick.

B_{21} 5 to 10 inches, yellowish-brown (10YR 5/6) silty clay with pockets of grayish brown (10YR 5/2); weak, medium, subangular blocky structure; very firm, sticky and plastic; numerous, small, round, black concretions; strongly acid; gradual, smooth boundary. 4 to 6 inches thick.

B_{22} 10 to 15 inches, yellowish-brown (10YR 5/6) silty clay to clay; moderate, medium, angular blocky structure; clay films on the surfaces of peds; very firm, sticky and very plastic; occasional, small, round, black concretions; strongly acid; gradual, smooth boundary. 4 to 7 inches thick.

B_3 15 to 20 inches, yellowish-brown (10YR 5/4) clay; few, fine, faint variegations of pale brown (10YR 6/3); weak, coarse, blocky structure; very firm, sticky and very

plastic; numerous, small, round, black concretions; medium acid; clear, smooth boundary. 3 to 7 inches thick.

C 20 to 26 inches, variegated light olive-brown (2.5Y 5/4) and yellowish-brown (10YR 5/4) clay with spots of brownish yellow (10YR 6/8); massive; very firm, sticky and plastic; few nodules of lime; few very fine root hairs; moderately alkaline; abrupt, smooth boundary. 5 to 8 inches thick.

D_r 26 inches, argillaceous limestone of the Richmond formation of the Ordovician geologic period.

In places the B_{21} horizon is strong brown (7.5YR 5/6). In some areas the B_3 horizon is absent and the C horizon is thicker than that in the profile described. In some places the C horizon is slightly acid. A few profiles have a thin concretionary zone. Depth to bedrock ranges from about 24 to 34 inches.

Mapped with this soil is a small acreage in which the soil is severely eroded and the surface layer is yellowish-brown (10YR 5/6) silty clay.

For Lowell silty clay loam, shallow, 2 to 6 percent slopes, eroded, the hazard of further erosion is moderate. The root zone is moderately deep over bedrock, and the moisture-supplying capacity is moderately high. Natural fertility is moderately high, and the supply of plant nutrients is fairly easy to build up. Permeability is moderately slow to slow, and the content of organic matter is low. The soil is somewhat difficult to till because of the moderately fine texture of the plow layer. (Capability unit IIIe–10.)

Lowell silty clay loam, shallow, 6 to 12 percent slopes, eroded (LrC2).—This well-drained soil has a yellowish-brown, fine-textured subsoil. It has stronger slopes than Lowell silty clay loam, shallow, 2 to 6 percent slopes, eroded, but its profile is similar.

For this soil, the hazard of further erosion is moderately high. The root zone is moderately deep over bedrock, and the moisture-supplying capacity is moderately low. The soil is moderately high in natural fertility, but it is somewhat difficult to till because of the moderately fine texture of the plow layer. Permeability is moderately slow to slow, and the content of organic matter is low. (Capability unit IVe–6.)

Lowell silty clay loam, shallow, 12 to 20 percent slopes, eroded (LrD2).—This well-drained soil formed in material weathered from limestone and siltstone. It has been more strongly influenced by siltstone than Lowell silty clay loam, shallow, 2 to 6 percent slopes, eroded. The subsoil is fine textured and is yellowish brown.

Mapped with this soil are small areas in which the subsoil is brown and the solum is coarser textured than typical. In these areas the parent material was mainly material weathered from siltstone.

For Lowell silty clay loam, shallow, 12 to 20 percent slopes, eroded, the hazard of further erosion is high. The root zone is moderately deep over rock, but the moisture-supplying capacity is moderately low. The soil is moderately high in natural fertility. Permeability is moderately slow to slow, and the content of organic matter is low. (Capability unit VIe–1.)

Lowell silty clay loam, shallow, 20 to 30 percent slopes, eroded (LrE2).—This soil has a fine-textured subsoil. Its profile is similar to that of Lowell silty clay loam, shallow, 2 to 6 percent slopes, eroded, but depth to bedrock is more variable and the underlying rock contains a higher proportion of siltstone.

Mapped with this soil are small areas in which the solum is coarser textured than typical and the B horizon is brown. In these areas the parent material was mainly material weathered from siltstone.

For Lowell silty clay loam, shallow, 20 to 30 percent slopes, eroded, the hazard of further erosion is high. The root zone is moderately deep over rock, but the moisture-supplying capacity is moderately low. The soil is moderately high in natural fertility, and the supply of plant nutrients is fairly easy to build up. Permeability is moderately slow to slow, and the content of organic matter is low. (Capability unit VIe–1.)

Lowell silty clay loam, shallow, 30 to 50 percent slopes, eroded (LrF2).—This soil has a profile similar to that of Lowell silty clay loam, shallow, 2 to 6 percent slopes, eroded, but the plow layer is yellowish brown (10YR 5/4) and the B horizon is slightly coarser textured. Also, in most places the solum is only 20 to 22 inches thick and the parent material has a higher proportion of material weathered from siltstone.

Mapped with this soil are small areas in which the soil has been affected by soil creep and where the plow layer is a dark yellowish-brown (10YR 4/4) silt loam. In a few places there are large outcrops of siltstone.

For Lowell silty clay loam, shallow, 30 to 50 percent slopes, eroded, the hazard of further erosion is very high. The root zone is shallow to moderately deep, and the moisture-supplying capacity is low. The soil is moderately high in natural fertility, and the supply of plant nutrients is fairly easy to build up. Permeability is moderately slow to slow in the lower horizons. The content of organic matter is low. (Capability unit VIIe–1.)

Lowell silty clay, shallow, 12 to 20 percent slopes, severely eroded (LsD3).—The subsoil of this well-drained soil is fine textured and is yellowish brown. The profile is similar to that of Lowell silty clay loam, shallow, 2 to 6 percent slopes, eroded, except that the plow layer in most places is yellowish-brown (10YR 5/6) silty clay. In places there are a few shallow gullies.

Mapped with this soil are small areas in which the surface layer is thin and consists of brown (10YR 4/3) silty clay loam; the B horizon is a thin layer of brown (7.5YR 4/4) silty clay loam; and the parent material is dominantly material weathered from siltstone.

For Lowell silty clay, shallow, 12 to 20 percent slopes, severely eroded, the hazard of further erosion is high. The root zone is shallow over rock, and the moisture-supplying capacity is low. The soil is moderate in natural fertility, but the supply of plant nutrients is fairly easy to build up. Permeability is moderately slow to slow, and the content of organic matter is very low. (Capability unit VIe–4.)

Lowell silty clay, shallow, 20 to 30 percent slopes, severely eroded (LsE3).—This soil has a fine-textured subsoil and developed in material weathered from siltstone. The plow layer is dominantly dark yellowish-brown (10YR 4/4) silty clay. Depth to bedrock is more variable than in Lowell silty clay loam, shallow, 2 to 6 percent slopes, eroded, and the parent material contains a higher proportion of material weathered from siltstone. In places there are a few shallow gullies.

Mapped with this soil is a small acreage in which the surface layer is brown (10YR 4/3) silty clay loam. In these areas the subsoil is thin and consists of brown (7.5YR 4/4) silty clay loam.

For Lowell silty clay, shallow, 20 to 30 percent slopes, severely eroded, the hazard of further erosion is high. The root zone is shallow over rock, and the moisture-supplying capacity is very low to low. The soil is moderately high in natural fertility, and the supply of plant nutrients is fairly easy to build up. Permeability is slow, and the content of organic matter is very low. (Capability unit VIIe-1.)

Lowell very rocky silty clay loam, 6 to 20 percent slopes, eroded (LvD2).—This well-drained soil formed mainly in material weathered from limestone. It has a yellowish-brown, fine-textured subsoil. The profile is similar to that of Lowell silt loam, 2 to 6 percent slopes, but the plow layer in most places is yellowish-brown (10YR 5/4) to dark yellowish-brown (10YR 4/4) very rocky silty clay loam. The solum is also thinner and finer textured, and rock outcrops are common. The solum ranges from 16 to 24 inches in thickness.

Mapped with this soil is a small acreage in which slopes are only 2 to 6 percent and another small acreage in which the soil is severely eroded.

For Lowell very rocky silty clay loam, 6 to 20 percent slopes, eroded, the hazard of further erosion is high. The root zone is shallow to moderately deep over rock, and the moisture-supplying capacity is low. The soil is moderately high in natural fertility, and the supply of plant nutrients is fairly easy to build up. Permeability is moderately slow, and the content of organic matter is low. (Capability unit VIs-1.)

Lowell very rocky silty clay, 20 to 30 percent slopes, severely eroded (LwE3).—This soil has a yellowish-brown, fine-textured subsoil. It formed mainly in material weathered from limestone. Outcrops of bedrock are numerous.

The profile of this soil is similar to that of Lowell silty clay loam, shallow, 2 to 6 percent slopes, eroded, but in most places the plow layer is yellowish-brown (10YR 5/6) silty clay. Also, the solum is only 14 to 24 inches thick, and outcrops of rock are common. In some places there are a few shallow gullies.

Mapped with this soil is a small acreage in which the soil is less eroded than typical and has a surface layer of silty clay loam. Also included are small areas in which the soil is free of rocks.

For Lowell very rocky silty clay, 20 to 30 percent slopes, severely eroded, the hazard of further erosion is very high. The root zone is shallow to very shallow over rock, and the moisture-supplying capacity is low. The soil is moderately high in natural fertility, and the supply of plant nutrients is fairly easy to build up. Permeability is moderately slow, and the content of organic matter is low to very low. (Capability unit VIIs-2.)

Made Land

Made land (Ma).—This miscellaneous land type consists of areas that have been changed by man. It includes areas that have been leveled by bulldozers so that they could be used as sites for buildings or towns and other areas that have been filled in. Most of the acreage is in towns, but some of it is in areas where iron ore was mined many years ago.

Melvin Series

The Melvin series consists of nearly neutral, poorly drained soils of first bottoms. The soils have a surface layer of mottled brown to grayish-brown silt loam that overlies mottled gray silty clay loam to silty clay. They formed in recent alluvium washed from soils that developed in material weathered from limestone. The soils are mainly in depressions or in old sloughs.

These soils are associated with the well drained Huntington, the moderately well drained Lindside, and the somewhat poorly drained Newark soils. They have the poorest drainage of any of these soils.

Some areas of Melvin soils have been drained and are used for crops. Part of the acreage is still in trees.

Melvin silt loam (0 to 2 percent slopes) (Me).—This is the only Melvin soil mapped in the county. It is on first bottoms along Slate and Flat Creeks and tributaries of those creeks. The soil is poorly drained and is nearly neutral. The following describes a profile in a moist field along Highway No. 111, 1.5 miles southwest of Wyoming:

A_p 0 to 6 inches, brown (10YR 4/3) fine silt loam; common, fine, distinct mottles of grayish brown (2.5Y 5/2) and dark brown (10YR 3/3); weak, fine and medium, granular structure; friable; mildly alkaline; clear, wavy boundary. 3 to 8 inches thick.

C_{1g} 6 to 35 inches, olive-gray (5Y 5/2) silty clay loam; common, fine, distinct, brown (10YR 4/3) mottles and common, dark-brown splotches from decayed roots; massive; firm, plastic; mildly alkaline; clear, smooth boundary. 20 to 40 inches thick.

C_{2g} 35 to 50 inches +, dark-gray (5Y 4/1) to dark greenish-gray (5GY 4/1) silty clay or silty clay loam; massive; firm, plastic and sticky; mildly alkaline.

This soil ranges from slightly acid to mildly alkaline. The color of the A_p horizon ranges from brown (10YR 4/3) to grayish brown (2.5Y 5/2).

This soil is very wet, but tile can be used to improve drainage to some extent. The root zone is deep, and the moisture-supplying capacity is very high. The soil is moderately high in natural fertility and is easy to till. Permeability is moderate, and the content of organic matter is medium. (Capability unit IIIw-5.)

Monongahela Series

The Monongahela series consists of moderately well drained soils on old, high stream terraces and second bottoms. The soils have a fragipan. In areas that are not eroded, they have a surface layer of dark grayish-brown to brown silt loam or fine sandy loam and a subsoil of silty clay loam to sandy clay loam. The fragipan is at a depth of about 24 inches. These soils formed in old stream alluvium washed from soils that developed in material weathered from acid sandstone and shale. They are naturally acid and are gently sloping to sloping.

These soils are associated with the somewhat poorly drained Tyler and poorly drained Purdy soils. They are better drained than the Tyler and Purdy soils.

The Monongahela soils are near Peasticks and along the Licking River and Salt Lick Creek. Most of the acreage has been cleared and is now used for row crops or pasture.

Monongahela fine sandy loam, 2 to 6 percent slopes (MfB).—This moderately well drained soil has a fragipan. The soil formed in alluvium derived from material weathered from sandstone. The following describes a

profile in a moist field along Adams Road, 0.6 of a mile east of Baileys Chapel:

A_{00} 1½ inches to ½ inch, loose litter from mixed hardwood trees.

A_0 ½ inch to 0, partially decomposed leaves, twigs, and roots.

A_1 0 to 2 inches, dark grayish-brown (10YR 4/2) fine sandy loam; weak, fine, granular structure; very friable; very strongly acid; clear, smooth boundary. 1 to 3 inches thick.

A_2 2 to 7 inches, yellowish-brown (10YR 5/4) fine sandy loam; weak, fine, granular structure; very friable; extremely acid; gradual, smooth boundary. 4 to 6 inches thick.

B_1 7 to 14 inches, yellowish-brown (10YR 5/4) fine sandy loam; weak, fine, subangular blocky structure; friable; extremely acid; gradual, smooth boundary. 6 to 9 inches thick.

B_2 14 to 24 inches, brownish-yellow (10YR 6/6) sandy clay loam; a few, fine, faint mottles of very pale brown (10YR 7/4) that soon disappear when exposed to air; moderate, fine, subangular blocky structure; friable; extremely acid; gradual, smooth boundary. 8 to 12 inches thick.

B_{3m1} 24 to 36 inches, yellowish-brown (10YR 5/6) clay loam; many, medium, distinct mottles of light gray (2.5Y 7/2); weak, medium, blocky structure; massive; friable, compact in place; very strongly acid; gradual, wavy boundary. 10 to 16 inches thick.

B_{3m2} 36 to 48 inches +, yellowish-brown (10YR 5/4) clay loam or silt loam; medium, common, distinct mottles of light yellowish brown (2.5Y 6/4); massive; friable, very compact in place; very strongly acid.

The color of the surface layer ranges from dark grayish brown (10YR 4/2) to brown (10YR 5/3). Depth to the fragipan ranges from 20 to 26 inches. In places small, round quartz pebbles are common throughout the profile. Depth to the C horizon ranges from 3 to 6 feet. The C horizon ranges from a few inches to more than 10 feet in thickness. It contains stratified layers of large pebbles, sand, and, in some places, chert.

For this soil, the hazard of erosion is moderately low. The soil is slightly wet, but tile drainage is generally not feasible. The root zone is moderately deep over the fragipan, and the moisture-supplying capacity is moderately high. Natural fertility is low, but the supply of plant nutrients is easy to build up. Permeability is moderately rapid above the fragipan, and the content of organic matter is low. The soil is easy to till. (Capability unit IIe-7; woodland suitability group 6.)

Monongahela fine sandy loam, 6 to 12 percent slopes (MfC).—This moderately well drained soil has a fragipan. The soil is on stream terraces and formed in alluvium derived from sandstone. It has stronger slopes than Monongahela fine sandy loam, 2 to 6 percent slopes, but its profile is similar.

For this soil, the hazard of erosion is moderate. This soil is slightly wet. The root zone is moderately deep over the fragipan, and the moisture-supplying capacity is moderately high. The soil is low in natural fertility, but the supply of plant nutrients is easy to build up. Permeability is moderately rapid above the fragipan, and the content of organic matter is low. The soil is easy to till. (Capability unit IIIe-9; woodland suitability group 6.)

Monongahela fine sandy loam, 6 to 12 percent slopes, eroded (MfC2).—This soil is moderately well drained and has a fragipan. It formed in alluvium derived from material weathered from sandstone. The profile of this soil is similar to that of Monongahela fine sandy loam, 2 to 6 percent slopes, but the plow layer is brown (10YR 5/3) fine sandy loam and consists of material from both the A and B horizons. Also, the fragipan is at a depth of only 16 to 20 inches from the surface.

For this soil, the hazard of further erosion is moderately high. The soil is slightly wet. The root zone is shallow over the fragipan, and the moisture-supplying capacity is moderately low. Natural fertility is low, but the supply of plant nutrients is easy to build up. Permeability is moderately rapid above the fragipan, and the content of organic matter is low. This soil is easy to till. (Capability unit IIIe-9; woodland suitability group 6.)

Monongahela silt loam, 0 to 2 percent slopes (MgA).—This moderately well drained soil of terraces has a fragipan. The soil formed in alluvium derived from old sandstone and shale. The following describes a profile in a moist field along Highway No. 211, 2.2 miles north of U.S. Highway 60:

A_1 0 to 4 inches, dark grayish-brown (2.5Y 4/2) silt loam; moderate, very fine, crumb structure; very friable; medium acid; clear, smooth boundary. 2 to 5 inches thick.

A_2 4 to 8 inches, light olive-brown (2.5Y 5/4) to light yellowish-brown (2.5Y 6/4) silt loam; weak, fine, granular structure; very friable; medium acid; clear, smooth boundary. 3 to 5 inches thick.

B_1 8 to 13 inches, light yellowish-brown (2.5Y 6/4) fine silt loam; weak, fine and medium, subangular blocky structure; friable; strongly acid; clear, smooth boundary. 4 to 6 inches thick.

B_2 13 to 24 inches, olive-yellow (2.5Y 6/6) to light olive-brown (2.5Y 5/6) silty clay loam; a few, fine, faint mottles of pale yellow (2.5Y 7/4); moderate, medium and coarse, subangular blocky structure; friable; very strongly acid; gradual, smooth boundary. 10 to 14 inches thick.

B_{3m1} 24 to 30 inches, light brownish-gray (2.5Y 6/2) silty clay loam; many, medium, distinct mottles of yellowish brown (10YR 5/6); massive or weak, medium and coarse, blocky structure; firm, compact in place; very strongly acid; clear, smooth boundary. 6 to 8 inches thick.

B_{3m2} 30 to 36 inches, light-gray (5Y 7/1) silty clay loam; many, medium, distinct mottles of brownish yellow (10YR 6/6) and yellowish brown (10YR 5/6); massive to weak, coarse, blocky structure; firm, very compact in place; extremely acid; abrupt, smooth boundary. 5 to 8 inches thick.

C_1 36 to 44 inches, gray (5Y 6/1) clay loam or sandy loam; many to common, medium, distinct mottles of light yellowish brown (2.5Y 6/4) and light olive brown (2.5Y 5/6); massive; friable; extremely acid; clear, smooth boundary. 6 to 10 inches thick.

C_2 44 inches +, brownish-yellow (10YR 6/8) to yellowish-brown (10YR 5/8) sandy loam; many, common, distinct mottles of light gray (2.5Y 7/2) and pale yellow (2.5Y 7/4); single grain; loose or very friable; extremely acid.

In many places the surface layer or A_p horizon is brown (10YR 5/3). The B_1 and B_2 horizons in some profiles are light yellowish brown (10YR 6/4) or brownish yellow (10YR 6/6). Depth to the fragipan ranges from 22 to 26 inches. The fragipan ranges from 12 to more than 28 inches in thickness. In many places small, rounded quartz pebbles occur throughout the profile. The C_1 horizon ranges from a few inches to more than 10 feet in thickness. In many places the C_2 horizon consists of stratified sand and gravel.

Mapped with this soil is a small acreage in which the soil is underlain by black fissile shale at a depth of 36 to 48 inches. This acreage is near Olympia Springs.

Monongahela silt loam, 0 to 2 percent slopes, is slightly wet, but tile drainage is generally not feasible. The root zone is moderately deep over the fragipan, and the moisture-supplying capacity is moderately high. Natural fertility is moderately low, but the supply of plant nutrients is easy to build up. Permeability is moderate above the fragipan, and the content of organic matter is medium to low. The soil is easy to till. (Capability unit IIw-2; woodland suitability group 9.)

Monongahela silt loam, 2 to 6 percent slopes (MgB).—This moderately well drained soil has a fragipan. The soil developed in old alluvium derived from sandstone and shale.

Mapped with this soil is a small acreage in which the soil is eroded and the plow layer is brown (10YR 5/3) to light yellowish brown (10YR 6/4). Also included are a few areas near Olympia Springs where the soil is underlain by black fissile shale, and another small acreage on foot slopes where the soil is similar to the typical soil but formed mainly in material weathered from shale.

For Monongahela silt loam, 2 to 6 percent slopes, the hazard of erosion is moderately low. The soil is slightly wet. The root zone is moderately deep over the fragipan, and the moisture-supplying capacity is moderately high. Natural fertility is moderately low, but the supply of plant nutrients is easy to build up. Permeability is moderate above the fragipan, and the content of organic matter is medium to low. The soil is easy to till. (Capability unit IIe-7; woodland suitability group 6.)

Monongahela silt loam, 6 to 12 percent slopes (MgC).—This soil is moderately well drained and has a fragipan. It developed in old alluvium derived from material weathered from sandstone and shale.

Mapped with this soil is a small acreage of a soil on foot slopes. In these areas the soil is similar to the typical soil, but it formed mainly in material derived from shale.

For Monongahela silt loam, 6 to 12 percent slopes, the hazard of erosion is moderate. The root zone is moderately deep over the fragipan, and the moisture-supplying capacity is moderately high. The soil is moderately low in natural fertility, but the supply of plant nutrients is easy to build up. Permeability is moderate above the fragipan, and the content of organic matter is medium to low. The soil is easy to till. (Capability unit IIIe-9; woodland suitability group 6.)

Monongahela silt loam, 6 to 12 percent slopes, eroded (MgC2).—This moderately well drained soil developed in old alluvium derived from material that weathered from sandstone and shale. It has a fragipan. The profile is similar to that of Monongahela silt loam, 0 to 2 percent slopes, but the surface layer is brown (10YR 5/3) to light olive brown (2.5Y 5/4), and the fragipan is at a depth of 16 to 20 inches.

Mapped with this soil is a small acreage in which the soil is severely eroded. In these severely eroded areas, the surface layer is predominantly light olive brown (2.5Y 5/4) or yellowish brown (10YR 5/4), the fragipan is 12 to about 16 inches below the surface, and there are shallow gullies in places.

For Monongahela silt loam, 6 to 12 percent slopes, eroded, the hazard of further erosion is moderate. The root zone is shallow over the fragipan, and the moisture-supplying capacity is moderately low. Natural fertility is moderately low, but the supply of plant nutrients is easy to build up. Permeability is moderate above the fragipan, and the content of organic matter is low. The soil is easy to till. (Capability unit IIIe-9; woodland suitability group 6.)

Mullins Series

The Mullins series consists of poorly drained soils that have a fragipan. The soils are on broad flats in the uplands. Their surface layer, a mottled, grayish-brown silt loam, overlies a subsoil of mottled, gray silt loam. The fragipan is at a depth of about 15 inches. The soils formed in material weathered predominantly from acid shale but partly from sandstone or siltstone. They are naturally acid and are nearly level.

These soils occur in assocation with the moderately well drained Tilsit and the moderately well drained to somewhat poorly drained Johnsburg soils. They are less well drained than the Tilsit and Johnsburg soils.

Only part of the acreage of Mullins soils has been cleared. The areas that have been cleared are used mainly for hay crops or pasture, but row crops are grown to some extent.

Mullins silt loam (0 to 2 percent slopes) (Mm).—This is the only Mullins soil mapped in the county. It is southeast and east of Owingsville in the area called the Knobs. The soil is poorly drained and has a fragipan. It formed mainly in material weathered from clay shale. The following describes a profile in a moist field along U.S. Highway No. 60, 0.9 of a mile west of Polksville.

A_p 0 to 9 inches, grayish-brown (10YR 5/2) silt loam; many, fine, faint mottles of yellowish brown (10YR 5/4); moderate, medium, crumb structure; very friable; very strongly acid; clear, smooth boundary. 6 to 10 inches thick.

B_g 9 to 15 inches, light brownish-gray (10YR 6/2) silt loam; common, medium, distinct mottles of strong brown (7.5YR 5/8) and light yellowish brown (10YR 6/4); moderate, fine, blocky structure; friable; few, medium-sized, soft, brown concretions; extremely acid, clear, smooth boundary. 4 to 9 inches thick.

B_{3m1} 15 to 30 inches, light-gray (10YR 7/1) silt loam; many, medium, distinct mottles of yellowish brown (10YR 5/6); massive; weak, medium, blocky structure; friable, compact in place, hard when dry; many, medium-sized, soft, brown concretions; extremely acid; gradual, smooth boundary. 12 to 18 inches thick.

B_{3m2} 30 to 48 inches, light-gray (N7) silt loam; many, medium and coarse, distinct mottles of brownish yellow (10YR 6/6); massive; weak, medium and coarse, blocky structure; friable, very compact in place, hard when dry; few, small, weathered fragments of sandstone in lower part; many, medium-sized, soft, brown concretions; extremely acid; 9 to 23 inches thick.

In some places the B horizons have a texture of silty clay loam. Depth to the fragipan ranges from 10 to 18 inches, and depth to bedrock, from 6 to about 8 feet.

This soil is very wet; water stands in the depressions after heavy rains, and tile drainage is not feasible. The root zone is shallow over the fragipan, and the moisture-supplying capacity is moderately low. The soil is low in natural fertility, but it is easy to till. Permeability is moderate above the fragipan, and the content of organic matter is low. (Capability unit IVw-1; woodland suitability group 9.)

Muse Series

The Muse series consists of deep, well-drained soils on toe slopes or alluvial fans. In areas that are not eroded, the surface layer is brown to dark-brown silt loam and the subsoil is reddish-brown to yellowish-red silty clay. Local alluvium was the material in which these soils formed. The alluvium washed from soils that developed in material weathered from black fissile shale or clay shale. The soils are naturally acid and are sloping to strongly sloping.

The Muse soils are in positions above areas of the Cruze soils, and they are on foot slopes below the areas of Colyer soils. They are better drained than the Cruze soils and are on somewhat steeper toe slopes. They are deeper than the Colyer soils and have a better developed profile.

The Muse soils are along the edges of stream valleys, southeast and east of Owingsville, in the part of the county called the Knobs. Many of the areas are still covered by a stand of mixed oaks, but some areas have been cleared and are used to grow tobacco and hay.

Muse silt loam, 6 to 12 percent slopes (MnC).—This well-drained soil is on toe slopes. It formed mainly in material weathered from black fissile shale, but partly in material weathered from soft clay shale. The following describes a profile in a moist field along a gravel road, 2.4 miles southwest of Olympia:

A_p 0 to 6 inches, brown (10YR 4/3) silt loam; moderate, fine and medium, granular structure and weak, medium, subangular blocky structure; friable; very strongly acid; clear, smooth boundry. 4 to 7 inches thick.

B_1 6 to 12 inches, dark-brown (7.5YR 4/4) silty clay loam; moderate, medium, subangular blocky structure; few clay films; friable to firm; extremely acid; gradual smooth boundary. 5 to 7 inches thick.

B_2 12 to 30 inches, reddish-brown (5YR 4/4) silty clay loam or silty clay with small specks of red (2.5YR 4/6); moderate to strong, medium and coarse, blocky structure; noticeable clay films; firm, slightly sticky and slightly plastic; small, dark concretions and pieces of shale; extremely acid; gradual, smooth boundary. 14 to 20 inches thick.

B_3 30 to 42 inches, yellowish-red (5YR 5/6) silty clay; common, medium, distinct variegations of yellow (2.5Y 7/6) and light brownish gray (2.5Y 6/2); moderate, medium and coarse, blocky structure; firm, slightly sticky and plastic; extremely acid; clear, smooth boundary. 10 to 14 inches thick.

C 42 to 50 inches +, variegated olive-yellow (2.5Y 6/6), yellowish-red (5YR 4/6), and light brownish-gray (2.5Y 6/2) silty clay and highly weathered shale; blocky and platy relict structure; firm, sticky and plastic; extremely acid.

In a few places the surface layer is very dark grayish brown (10YR 3/2). In some places the color of the B_2 horizon ranges to yellowish red (5YR 5/6) or strong brown (7.5YR 5/8). In a few places the soil contains fragments of sandstone and siltstone derived from formations that lie above the shale. Various amounts of small fragments of black shale occur throughout the profile.

For this soil, the hazard of erosion is moderate. The root zone is deep, and the moisture-supplying capacity is very high. Natural fertility is moderately low, but the supply of plant nutrients is easy to build up. Permeability is moderate in the upper part of the profile and moderately slow in the lower part. The content of organic matter is medium. The soil is easy to till. (Capability unit IIIe-2; woodland suitability group 8.)

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Muse silt loam, 12 to 20 percent slopes (MnD).—This well-drained soil developed in colluvium derived mainly from material weathered from black fissile shale. Its profile is similar to that of Muse silt loam, 6 to 12 percent slopes.

For this soil, the hazard of erosion is high. The root zone is deep, and the moisture-supplying capacity is very high. Natural fertility is moderately low, but the supply of plant nutrients is easy to build up. Permeability is moderate in the upper part of the profile and moderately slow in the lower part. The content of organic matter is medium. This soil is easy to cultivate, but the strong slopes make the use of farm machinery difficult. (Capability unit IVe-3; woodland suitability group 8.)

Muse silty clay loam, 6 to 12 percent slopes, eroded (MsC2).—This well-drained colluvial soil developed in material derived mainly from black fissile shale. Its profile is similar to that of Muse silt loam, 6 to 12 percent slopes, but in most places the surface layer is brown (7.5YR 4/4) or dark yellowish-brown (10YR 4/4) silty clay loam. In places the surface layer contains shale.

Mapped with this soil is a small acreage in which the soil is severely eroded. In the severely eroded areas, the surface layer has a finer texture than in the typical soil.

For Muse silty clay loam, 6 to 12 percent slopes, eroded, the hazard of further erosion is moderate. The root zone is deep, and the moisture-supplying capacity is high. Natural fertility is low, but the supply of plant nutrients is easy to build up. Permeability is moderate in the upper part of the profile and moderately slow in the lower part. The content of organic matter is low. Because of the fine texture of the surface layer, this soil is somewhat difficult to till. (Capability unit IIIe-2; woodland suitability group 8.)

Muse silty clay loam, 12 to 20 percent slopes, eroded (MsD2).—This soil is well drained. It developed in colluvium derived mainly from material weathered from black fissile shale. The profile of this soil is similar to that of Muse silt loam, 6 to 12 percent slopes, but in most places the surface layer is dark-brown (7.5YR 4/4) silty clay loam. In a few places the surface layer is shaly.

Mapped with this soil is a small acreage in which the soil is eroded and has slopes of 20 to 30 percent.

For Muse silty clay loam, 12 to 20 percent slopes, eroded, the hazard of further erosion is high. The root zone is deep, and the moisture-supplying capacity is high. Natural fertility is moderately low, but the supply of plant nutrients is easy to build up. Permeability is moderate in the upper part of the profile and moderately slow in the lower part. The content of organic matter is low. This soil is somewhat difficult to till because of the fine texture of the plow layer. Also, the strong slopes make the use of farm machinery difficult. (Capability unit IVe-3; woodland suitability group 8.)

Muskingum Series

The Muskingum series consists of somewhat excessively drained to excessively drained, shallow soils on hillsides. In areas that are not eroded, the surface layer is dark grayish-brown or dark yellowish-brown silt loam. The subsoil is yellowish-brown silt loam, and in most places it is stony. The soils developed in material weathered from acid sandstone, siltstone, and shale. As a result,

they are naturally acid. Areas of these soils on narrow ridgetops are sloping, but those on the hillsides are steep.

The steeply sloping Muskingum soils are associated with the Rockcastle soils. They are in positions above those occupied by the Rockcastle soils and have a coarser textured subsoil than those soils. In addition, they are underlain by siltstone, sandstone, and brittle shale rather than by soft clay shale.

The Muskingum soils are extensive in the mountainous southeastern part of the county. Most of the acreage is still in mixed hardwoods.

Muskingum stony silt loam, 6 to 20 percent slopes (MuD).—This somewhat excessively drained, shallow soil is on narrow ridgetops and on the upper parts of hillsides. It developed in material weathered from acid sandstone, siltstone, and shale. The following describes a profile in a moist woods along Highway No. 36, 0.2 of a mile south of the junction with Highway No. 211, near the Menifee County line:

A_{00} 1 to ½ inch, scattered leaves and twigs.

A_0 ½ inch to 0, partially decomposed forest litter, moss, and roots.

A_1 0 to 3 inches, dark grayish-brown (10YR 4/2) to very dark grayish-brown (10YR 3/2) stony silt loam; weak, fine, granular structure; very friable; very strongly acid; clear, smooth boundary. 2 to 4 inches thick.

A_2 3 to 7 inches, dark yellowish-brown (10YR 4/4) to yellowish-brown (10YR 5/4) silt loam; weak, very fine and fine, granular structure; very friable; stones are common; extremely acid; gradual, smooth boundary. 3 to 5 inches thick.

BC 7 to 13 inches, yellowish-brown (10YR 5/4 to 5/6) gravelly silt loam; weak, fine and medium, subangular blocky structure; friable; stones 10 to 20 inches across are common; extremely acid; gradual, smooth boundary. 4 to 6 inches thick.

C 13 to 19 inches, yellowish-brown (10YR 5/4) coarse gravelly silty clay loam splotched with strong brown (7.5YR 5/6); weak, medium, subangular blocky structure; friable; stones of the same size as those in the BC horizon; extremely acid; gradual, wavy boundary. 5 to 12 inches thick.

In some places the A_1 horizon is dark brown (10YR 3/3 to 4/3). In some areas the A_2 horizon and the C horizon are light olive brown (2.5Y 5/4 to 5/6) or light yellowish brown (2.5Y 6/4). In places the BC horizon is absent. The number of pebbles and stones varies from place to place.

Mapped with this soil are a few areas that are practically free of stones and other small areas that are not eroded. Also included are a few small, scattered areas of a Caneyville soil, which is not mapped separately in this county. The Caneyville soil formed in mixed material weathered from limestone and sandstone, and it has a reddish subsoil. It occurs in places just below thick outcrops of sandstone at the place where the Mississippian and Pennsylvanian geologic formations join.

For Muskingum stony silt loam, 6 to 20 percent slopes, the hazard of erosion is moderately high. The root zone is shallow over shattered rock, and the moisture-supplying capacity is moderately high. Natural fertility is moderately low, but the supply of plant nutrients is easy to build up. Permeability is rapid, and the content of organic matter is low. (Capability unit VIs–3; woodland suitability groups 3 and 4.)

Muskingum stony silt loam, 20 to 30 percent slopes (MuE).—This soil is shallow and is somewhat excessively drained. It is on hillsides, where it formed in material weathered from acid sandstone, siltstone, and shale. This soil has stronger slopes than Muskingum stony silt loam, 6 to 20 percent slopes, but its profile is similar to the profile of that soil.

For this soil, the hazard of erosion is high. The root zone is shallow over shattered rock, and the moisture-supplying capacity is moderately high. The soil is moderately low in natural fertility, but the supply of plant nutrients is easy to build up. Permeability is rapid, and the content of organic matter is low. (Capability unit VIIs–1; woodland suitability groups 1, 3, and 4.)

Muskingum stony silt loam, 30 to 50 percent slopes (MuF).—This soil is somewhat excessively drained. It is shallow and formed in material weathered from acid sandstone, siltstone, and shale.

Mapped with this soil are a few areas of massive sandstone bluffs.

For Muskingum stony silt loam, 30 to 50 percent slopes, the hazard of erosion is very high. The root zone is shallow over shattered rock, and the moisture-supplying capacity is moderate. The soil is low in natural fertility. Permeability is rapid, and the content of organic matter is low. (Capability unit VIIs–1; woodland suitability groups 1, 3, and 4.)

Muskingum stony silt loam, 50 to 80 percent slopes (MuG).—This shallow, excessively drained soil is on hillsides. It has much steeper slopes than Muskingum stony silt loam, 6 to 20 percent slopes, but its profile is similar.

Mapped with this soil are a few areas of massive sandstone bluffs. Also included are a few areas of a Rockcastle silt loam, which has a fine-textured subsoil.

For Muskingum stony silt loam, 50 to 80 percent slopes, the hazard of erosion is very high. The root zone is shallow over shattered rock, and the moisture-supplying capacity is moderate. The soil is low in natural fertility. Permeability is rapid, and the content of organic matter is low. (Capability unit VIIs–3; woodland suitability groups 1, 3, and 4.)

Newark Series

The Newark series consists of nearly neutral, somewhat poorly drained soils of first bottoms. The soils have a surface layer of dark grayish-brown silt loam. Below the surface layer is dark grayish-brown to olive-brown light silty clay loam over silty clay loam that is olive gray. The soils formed in recent alluvium washed from soils that developed in material weathered from limestone.

These soils occur in association with the well drained Huntington, the moderately well drained Lindside, and the poorly drained Melvin soils. They are less well drained than the Huntington and Lindside soils and are better drained than the Melvin soils.

Nearly all of the acreage of Newark soils has been cleared and is used for row crops, hay, or pastures. A few areas are idle.

Newark silt loam (0 to 2 percent slopes) (Ne).—This is the only Newark soil mapped in the county. It is on first bottoms in the part of the county underlain by lime-

stone. The soil is somewhat poorly drained and is nearly neutral. The following describes a profile in a moist field along Highway No. 111, 1.5 miles southwest of Wyoming:

A_p 0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular structure; very friable; slightly acid; gradual, wavy boundary. 6 to 8 inches thick.

C_1 8 to 19 inches, dark grayish-brown (2.5Y 4/2) to olive-brown (2.5Y 4/4) light silty clay loam; common, fine, faint mottles of dark yellowish brown (10YR 4/4) and grayish brown (2.5Y 5/2); weak, fine, granular structure to massive; friable, slightly plastic; neutral; gradual, smooth boundary. 10 to 12 inches thick.

C_{2g} 19 to 50 inches +, olive-gray (5Y 5/2) silty clay loam; common, fine and medium, distinct mottles of brown (10YR 4/3) and fine, medium, distinct mottles of dark reddish brown (5YR 3/2); massive; friable, slightly plastic; neutral.

In places the A_p layer is brown (7.5YR 5/4) or dark brown (7.5YR 3/2). In some places the C horizons have a texture of silt loam. The soil ranges from slightly acid to mildly alkaline in reaction.

Mapped with this soil are a few areas of a soil formed in local alluvium.

Newark silt loam is moderately wet, but tile can be used to improve the drainage. The root zone is deep, and the moisture-supplying capacity is very high. Natural fertility is moderately high, and the supply of plant nutrients is fairly easy to build up. Permeability is moderate, and the content of organic matter is medium. The soil is easy to till. (Capability unit IIw–4.)

Nicholson Series

The Nicholson series consists of well drained to moderately well drained soils that have a fragipan. The soils are on gently sloping ridgetops in the uplands. Their surface layer is brown to dark-brown silt loam, and their subsoil is yellowish-brown to strong-brown silty clay loam. The fragipan is at a depth of about 32 inches. The soils formed in material weathered from limestone, siltstone, and calcareous shale. They are slightly acid to mildly alkaline.

These soils lie below areas of Shelbyville soils on the ridgetops and above areas of Lowell and Eden soils on the side slopes. They differ from the Shelbyville soils primarily in having a fragipan instead of a concretionary zone. The Nicholson soils have a coarser textured subsoil than the Lowell soils and better developed soil horizons than the Eden soils. They also differ from the Lowell and Eden soils in having a fragipan.

All of the acreage of Nicholson soils has been cleared. It is used to grow tobacco and hay, which produce high yields.

Nicholson silt loam, 0 to 6 percent slopes (NkB).—This is the only Nicholson soil mapped in the county, and it is mainly near Sharpsburg. The soil has a surface layer that is darker and thicker than normal for the series, and it has a higher pH than typical. These characteristics are attributed to the activities of the Indians because there are mounds in this area and other evidence that an Indian reservation was once located on this soil.

The soil is well drained to moderately well drained and has a fragipan. It developed in material weathered from interbedded siltstone, calcareous shale, and limestone. The following describes a profile in a moist field along Highway No. 11, 0.1 of a mile east of the junction with Highway No. 36:

A_p 0 to 8 inches, brown (10YR 4/3) to dark-brown (10YR 3/3) silt loam; moderate, fine, granular structure; friable; mildly alkaline; clear, smooth boundary. 7 to 9 inches thick.

A_2 8 to 16 inches, brown (10YR 4/3) silt loam; moderate, fine, granular structure; friable; mildly alkaline; clear, smooth boundary. 7 to 9 inches thick.

B_1 16 to 23 inches, dark yellowish-brown (10YR 4/4) silt loam or silty clay loam; common, medium, very faint variegations of yellowish brown (10YR 5/4); weak, medium, subangular blocky structure; friable; slightly sticky and slightly plastic; mildly alkaline; gradual, smooth boundary. 6 to 8 inches thick.

B_2 23 to 32 inches, yellowish-brown (10YR 5/4) silty clay loam; common, fine, faint mottles of dark yellowish brown (10YR 4/4) and light yellowish brown (2.5Y 6/4); moderate, fine and medium, blocky structure; discontinuous clay films; firm, slightly sticky and slightly plastic; mildly alkaline; clear, smooth boundary. 9 to 11 inches thick.

B_{3m} 32 to 44 inches, yellowish-brown (10YR 5/4) silty clay loam; common, medium, distinct mottles of light brownish gray (2.5Y 6/2) to grayish brown (2.5Y 5/2) and dark yellowish brown (10YR 4/4); moderate, medium, blocky structure; firm, compact in place, slightly sticky and plastic; few, small, black concretions; neutral; gradual, smooth boundary. 10 to 14 inches thick.

C_g 44 to 50 inches +, mottled silty clay; many, medium and coarse mottles of gray (5Y 6/1), strong brown (7.5YR 5/6), and brownish yellow (10YR 6/6); coarse, blocky structure; firm, compact in place, slightly sticky and slightly plastic; many black concretions; strongly acid.

The A_p and A_2 horizons combined range from 7 to 16 inches in thickness. Depth to the fragipan ranges from about 24 to 36 inches. In places the B_2 horizon is strong brown (7.5YR 5/6), and in places it is very strongly acid.

For this soil, the hazard of erosion is moderately low. The root zone is moderately deep over the fragipan, and the moisture-supplying capacity is high. Natural fertility is high, and the soil is easy to till. Permeability is moderate above the fragipan, and the content of organic matter is medium. (Capability unit IIe–10.)

Otway Series

The Otway series consists of calcareous, somewhat excessively drained to excessively drained, shallow soils on steep hillsides. In areas that are not eroded, the surface layer is very dark grayish-brown silty clay and the subsoil is clayey. Below the subsoil is calcareous clay containing small pockets of sandy loam. The soils formed in material weathered from soft, calcareous shale or marl interbedded with thin layers of sandy dolomite. They are mildly alkaline to strongly alkaline and are sloping to steep.

These soils are associated with the flaggy Fairmount soils. They are in higher positions than the Fairmount soils, contain fewer stones, and are underlain by calcareous, soft clay shale rather than limestone. In some places the Otway soils are associated with the Shrouts soils. They are in lower positions than the Shrouts soils, have a darker colored surface layer, and have sand in the parent material. On the ridgetops the Otway soils are

associated with the Beasley soils. They have a darker colored, fined textured surface layer than the Beasley soils and a thinner, less red, and less developed B horizon.

The Otway soils are mainly north of Owingsville in the area called the Outer Bluegrass. They erode easily. All of the acreage has been cleared and used for crops, but most of it is now used for pasture or is in scrub hardwoods mixed with some redcedar.

Otway silty clay, 6 to 12 percent slopes (OtC).—This dark-colored, calcareous soil is shallow and is somewhat excessively drained. It is on narrow ridgetops, where it formed in material weathered from soft, calcareous shale that resembles marl. The following describes a profile in a moist field along Highway No. 965, 0.9 of a mile northeast of Preston:

A_p 0 to 5 inches, very dark grayish-brown (10YR 3/2) to very dark gray (10YR 3/1) silty clay; strong, fine, granular structure; friable to firm, slightly sticky and slightly plastic; mildly alkaline; clear, wavy boundary. 4 to 6 inches thick.

B_2 5 to 18 inches, yellowish-brown (10YR 5/4) silty clay or clay; few, fine and medium, distinct variegations of dark brown (10YR 3/3) and light yellowish brown (2.5Y 6/4); strong, fine and medium, blocky structure; thick, continuous clay films on the surfaces of peds; very firm, sticky and plastic; moderately alkaline; clear, wavy boundary. 8 to 14 inches thick.

C_1 18 to 23 inches, variegated yellowish-brown (10YR 5/6), dark-brown (10YR 3/3), and light yellowish-brown (2.5Y 6/4) clay with small pockets of brownish-yellow (10YR 6/8) sandy clay loam; weak, coarse, blocky structure to massive; very firm, sticky and plastic; strongly alkaline and calcareous; clear, smooth boundary. 4 to 8 inches thick.

C_2 23 to 40 inches, light greenish-gray (5GY 7/1) clay with variegations of light olive brown (2.5Y 5/4); massive with relict platy structure; very firm, sticky and plastic except for sandy pockets; few, soft, calcareous pebbles of sandstone, less than 1 inch in diameter, and pockets of sandy loam; strongly alkaline. 12 to 26 inches thick.

D_r 40 inches +, gray, soft, calcareous shale with thin-bedded layers of brown, sandy dolomite of the Whitewater member of the Richmond formation, Ordovician geologic period.

In places the B_2 horizon is light olive brown (2.5Y 4/4). In some places the soil is calcareous, but in most places it is mildly alkaline to strongly alkaline. Depth to the C horizon or to marl ranges from 14 to 24 inches. Small pockets of sand occur in varying amounts throughout the profile, and in these areas the C horizon has a texture of clay loam.

Mapped with this soil is a small acreage in which the slope is 2 to 6 percent, and another small acreage in which the texture of the surface layer is cherty silty clay loam.

For Otway silty clay, 6 to 12 percent slopes, the hazard of erosion is moderately high. The root zone is shallow, and the moisture-supplying capacity is moderately low. The soil is high in natural fertility. Permeability is moderately slow, and the content of organic matter is high. Because of the moderately fine texture of the surface layer, this soil is somewhat difficult to till. (Capability unit IVe-6; woodland suitability group 10.)

Otway silty clay, 6 to 12 percent slopes, eroded (OtC2).—This calcareous, shallow soil is excessively drained. It is on hillsides and formed in material weathered from soft, calcareous shale. The profile is similar to that of Otway silty clay, 6 to 12 percent slopes, but the plow layer is lighter colored because material from the subsoil has been mixed with the original surface soil. Also, depth to the C horizon is only 8 to 13 inches, and depth to bedrock, 16 to 30 inches.

Mapped with this soil is a small acreage in which the soil is severely eroded. In the severely eroded areas, the plow layer is yellowish brown to light yellowish brown and consists chiefly of clay loam to clay parent material. Also included are some areas in which the soil is eroded and has slopes of 2 to 6 percent.

For Otway silty clay, 6 to 12 percent slopes, eroded, the hazard of further erosion is high. The root zone is shallow, and the moisture-supplying capacity is very low. The soil is moderately low in natural fertility and is difficult to till because of the fine texture of the plow layer. Permeability is moderately slow, and the content of organic matter ranges from medium to very low. (Capability unit VIe-1; woodland suitability group 10.)

Otway silty clay, 12 to 20 percent slopes, eroded (OtD2).—The profile of this calcareous, excessively drained soil is similar to that of Otway silty clay, 6 to 12 percent slopes, but the plow layer is lighter colored because material from the subsoil has been mixed with the original surface soil. Depth to the C horizon is only 8 to 13 inches, and depth to bedrock, only 16 to 30 inches.

Mapped with this soil is a small acreage in which the soil consists mainly of parent material and has a texture of clay loam to clay. Also included is a small acreage in which there has been little or no erosion.

For Otway silty clay, 12 to 20 percent slopes, eroded, the hazard of further erosion is high. The root zone is shallow, and the moisture-supplying capacity is very low. The soil is moderately low in natural fertility. Permeability is moderately slow, and the content of organic matter ranges from medium to very low. (Capability unit VIIs-3; woodland suitability group 10.)

Otway silty clay, 20 to 30 percent slopes, eroded (OtE2).—This soil is calcareous and is shallow and excessively drained. It is on hillsides and formed in material weathered from soft, calcareous shale. The profile of this soil is similar to that of Otway silty clay, 6 to 12 percent slopes, but the plow layer is lighter colored because material from the B horizon has been mixed with the original surface soil. Also, depth to the C horizon is only 7 to 13 inches, and depth to bedrock, only 14 to 30 inches.

Mapped with this soil is a small acreage in which the soil consists mainly of parent material and has a texture of clay loam to clay. Also included is a small acreage in which the soil is cherty and another small acreage in which there has been little or no erosion.

For Otway silty clay, 20 to 30 percent slopes, eroded, the hazard of further erosion is very high. The root zone is very shallow, and the moisture-supplying capacity is very low. The soil is moderately low in natural fertility. Permeability is moderately slow, and the content of organic matter ranges from medium to very low. (Capability unit VIIs-3; woodland suitability group 10.)

Otway silty clay, 30 to 50 percent slopes, eroded (OtF2).—This calcareous, excessively drained soil is shallow. It formed in material weathered from soft, calcareous shale. The profile is similar to that of Otway silty clay, 6 to 12 percent slopes, but the plow layer is lighter colored because material from the B horizon has been

mixed with the original surface soil. Depth to the C horizon is only 2 to 12 inches, and depth to bedrock, only 12 to 28 inches.

Mapped with this soil is a small acreage in which little or no erosion has taken place.

For Otway silty clay, 30 to 50 percent slopes, eroded, the hazard of further erosion is very high. The root zone is shallow, and the moisture-supplying capacity is very low. The soil is low in natural fertility. Permeability is moderately slow, and the content of organic matter ranges from medium to very low. (Capability unit VIIs-3; woodland suitability group 10.)

Philo Series

The Philo series consists of naturally acid, moderately well drained soils of first bottoms. The soils have a surface layer of dark grayish-brown silt loam or fine sandy loam. The underlying material is olive-brown silt loam that is mottled at a depth below about 20 inches. The soils formed in recent alluvium washed from soils that developed in material weathered from acid sandstone, siltstone, and shale.

These soils are associated with the well-drained Pope, the somewhat poorly drained Stendal, and the poorly drained Atkins soils. They are less well drained than the Pope soils, but they are better drained than the Stendal and Atkins soils.

Most of the acreage of Philo soils has been cleared. It is used mainly to grown corn.

Philo silt loam (0 to 2 percent slopes) (Ph).—This is the only Philo soil mapped in the county. It is on first bottoms along streams in the southern part of the county. The soil is moderately well drained. It formed in recent, acid alluvium derived from sandstone, siltstone, and shale. The following describes a profile in a moist field along Highway No. 36 at the junction with Highway No. 211:

A_p 0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, crumb structure; very friable; medium acid; gradual, wavy boundary. 5 to 9 inches thick.

C_1 8 to 20 inches, olive-brown (2.5Y 4/4) to light olive-brown (2.5Y 5/4) silt loam; weak, fine, crumb structure; very friable; medium acid; gradual, wavy boundary. 10 to 16 inches thick.

C_2 20 to 30 inches, olive-brown (2.5Y 4/4) silt loam; common, medium, distinct mottles of pale olive (5Y 6/3); weak, fine, subangular blocky structure to massive; porous and friable; very strongly acid; gradual, irregular boundary. 10 to 14 inches thick.

C_{3g} 30 to 48 inches +, light olive-brown (2.5Y 5/4 to 5/6) silt loam; common, medium, distinct mottles of pale olive (5Y 6/3); few dark specks from decayed roots; massive, but porous; very strongly acid.

In places the A_p horizon is dark yellowish brown (10YR 4/4). In some places the C horizons are light olive brown (2.5Y 5/4) or light yellowish brown (10YR 6/4).

Mapped with this soil is a small acreage in which the texture of the surface layer is fine sandy loam.

For Philo silt loam, there is no hazard of erosion. The soil is slightly wet, but the drainage can be improved by tile. The root zone is deep, and the moisture-supplying capacity is very high. Natural fertility is moderately high, and the supply of plant nutrients is easy to build up. Permeability is moderately rapid, and the content of organic matter is medium. This soil is easy to till. (Capability unit I-2.)

Pope Series

The Pope series consists of naturally acid, well-drained to somewhat excessively drained soils of first bottoms. The soils have a surface layer of dark grayish-brown silt loam or fine sandy loam that overlies brown to yellowish-brown silt loam or fine sandy loam. Recent alluvium was the parent material of these soils. The alluvium washed from soils that formed in material weathered from acid sandstone, siltstone, and shale.

These soils are associated with the moderately well drained Philo, the somewhat poorly drained Stendal, and the poorly drained Atkins soils. They are better drained than any of the associated soils.

The Pope soils are in the southeastern and eastern parts of the county, which are underlain by sandstone or shale. Most of the acreage has been cleared, but a few areas are still in trees. Corn is the main crop grown.

Pope silt loam (0 to 2 percent slopes) (Po).—This is a well-drained soil of first bottoms that formed in recent alluvium derived from acid sandstone, siltstone, and shale. The following describes a profile in a moist field near the junction of Highways No. 36 and 211:

A_p 0 to 9 inches, dark grayish-brown (10YR 4/2) to light olive-brown (2.5Y 5/4) silt loam; weak, fine, crumb structure; friable; medium acid; clear, smooth boundary. 5 to 10 inches thick.

C_1 9 to 40 inches, brown (10YR 5/3 to 4/3) to yellowish-brown (10YR 5/6) silt loam; weak, medium and fine, granular structure; porous and friable; strongly acid; gradual, smooth boundary. 25 to 40 inches thick.

C_2 40 inches +, stratified silty and sandy layers with an admixture of fragments of sandstone and shale.

In some places the A_p horizon is dark yellowish brown (10YR 4/4), and in a few places the C horizons are light olive brown (2.5Y 5/4).

Mapped with this soil are a few small areas in which the soil is gently sloping to sloping and a few areas in which the texture of the surface layer is loam. Also included is a small acreage near Preston where the soils have been influenced by limestone.

For Pope silt loam, there is no hazard of erosion. This soil is not wet. It has a deep root zone and very high moisture-supplying capacity. Natural fertility is moderately high, and the supply of plant nutrients is fairly easy to build up. Permeability is moderately rapid, and the content of organic matter is medium. This soil is easy to till. (Capability unit I-1.)

Pope fine sandy loam (0 to 2 percent slopes) (Pm).—This well-drained to somewhat excessively drained soil of first bottoms developed in recent alluvium derived from acid sandstone. The profile of this soil is similar to that of Pope silt loam, but the A_p horizon is dominantly yellowish brown (10YR 5/4) and has a texture of fine sandy loam. Also, the C horizon is structureless (single grain).

Mapped with this soil are small areas in which the texture of the surface layer is very fine sandy loam, sandy loam, or loamy sand.

For Pope fine sandy loam, there is no hazard of erosion. This soil is not wet. It has a deep root zone and moderately high moisture-supplying capacity. Natural fertility is moderately low, but the supply of plant nutrients is fairly easy to build up. Permeability is moderately rapid,

and the content of organic matter is low. The soil is easy to till. (Capability unit I–1.)

Pope gravelly silt loam (0 to 2 percent slopes) (Pn).—This well-drained to somewhat excessively drained soil formed in recent alluvium derived from acid sandstone, siltstone, and shale. Its profile is similar to that of Pope silt loam, but this soil is gravelly throughout (20 to 50 percent, by volume, is gravel), and the color of the C horizon is more yellowish.

Mapped with this soil is a small acreage of a soil formed in local alluvium.

For Pope gravelly silt loam, there is no hazard of erosion. This soil is not wet. It has a deep root zone and moderately high moisture-supplying capacity. Natural fertility is moderately low, but the supply of plant nutrients is fairly easy to build up. Permeability is moderately rapid, and the content of organic matter is low. Tillage is somewhat difficult because of the content of gravel. (Capability unit IIs–1.)

Purdy Series

The Purdy series consists of poorly drained soils of old, high stream terraces or second bottoms. The soils have a fragipan. They have a surface layer of gray silt loam and a subsoil of gray, mottled silt loam. The fragipan is at a depth of about 15 inches. The soils formed in old stream alluvium washed from soils that developed in material weathered from acid sandstone, siltstone, and shale. They are naturally acid.

These soils are associated with the moderately well drained Monongahela and somewhat poorly drained Tyler soils. They are more poorly drained than the associated soils.

In this county only about two-thirds of the acreage of Purdy soil has been cleared and is used for row crops or hay. Many areas are idle or in timber.

Purdy silt loam (0 to 2 percent slopes) (Pr).—This is the only Purdy soil mapped in the county. The soil is on terraces near Peasticks and along the Licking River and Salt Lick Creek. It is poorly drained and has a fragipan. The following describes a profile in a moist field along Highway No. 965, 0.1 of a mile north of Preston:

A_1 0 to 3 inches, gray (10YR 5/1) to dark-gray (10YR 4/1) silt loam; weak, fine and medium, granular structure; very friable; very strongly acid; abrupt, smooth boundary. 2 to 5 inches thick.

A_2 3 to 9 inches, light brownish-gray (10YR 6/2) silt loam; common, fine and medium, distinct mottles of strong brown (7.5YR 5/6) and yellowish brown (10YR 5/6); weak, fine, granular and weak, fine, subangular blocky structure; friable; very strongly acid; clear, smooth boundary. 4 to 9 inches thick.

B_g 9 to 15 inches, gray to light-gray (10YR 6/1) silt loam; common, prominent mottles of strong brown (7.5YR 5/6); weak, medium, blocky structure; friable; few, small, soft, brown concretions of irregular shape; extremely acid; clear, smooth boundary. 5 to 9 inches thick.

B_{3m1g} 15 to 28 inches, light-gray (N 7/0) silt loam; common, medium, distinct mottles of yellowish brown (10YR 5/6); weak, medium and coarse, blocky structure to massive; friable, compact in place, hard when dry; few, small, brown, soft concretions of irregular shape; extremely acid; gradual, smooth boundary. 10 to 16 inches thick.

B_{3m2g} 28 to 48 inches +, gray (N 7/0) silt loam; many, medium, prominent mottles of strong brown (7.5YR 5/8); weak, coarse, angular blocky structure to massive; friable; very compact in place, hard when dry; few, soft, medium-sized, brown concretions; extremely acid.

In some places the A horizon is grayish brown (2.5Y 5/2). In places the B_g horizon has a texture of silty clay loam rather than silt loam. In a few areas close to large drainage ditches, this soil is better drained than typical. Depth to the fragipan ranges from 14 to 24 inches, in some areas within short distances. In places the fragipan is only weakly expressed. The fragipan overlies a buried A and B horizon in some areas. The alluvium ranges from 5 to more than 10 feet in thickness.

Mapped with this soil is a small acreage in which the texture of the surface layer is fine sandy loam.

Purdy silt loam is very wet; water stands in the depressions after heavy rains, and tile drainage is generally not feasible. The root zone is shallow over the fragipan, and the moisture-supplying capacity is moderately low. The soil is low in natural fertility, but it is easy to till. Permeability is moderate above the fragipan. The content of organic matter is low. (Capability unit IVw–1; woodland suitability group 9.)

Rarden Series

The Rarden series consists of moderately deep, well drained to moderately well drained soils of uplands. In areas that are not eroded, the soils have a surface layer of grayish-brown silt loam over yellowish-red silty clay. The underlying material is variegated red and greenish-gray silty clay or clay. The soils formed in material weathered from soft clay shale, and they are naturally acid. Their slope ranges from gentle to strong.

These soils occur in association with the Johnsburg and Rockcastle soils. They have stronger slopes and are better drained than the Johnsburg soils. The Rarden soils are more nearly level, have a thicker solum and a redder subsoil than the Rockcastle soils, and they also have a better developed profile.

The Rarden soils are southeast and east of Owingsville in the area called the Knobs. Part of the acreage has been cleared and is used for hay or pasture, but many areas are covered by mixed hardwoods.

Rarden silt loam, 2 to 6 percent slopes (RaB).—This moderately deep, well drained to moderately well drained soil has a fine-textured subsoil. The soil formed in material weathered from clay shale. The following describes a profile in a moist field along a farm road, 1 mile east of Olympia Springs:

A_{00} ½ inch to 0, partly decomposed leaves and twigs.

A_p 0 to 7 inches, grayish-brown (10YR 5/2) to dark grayish-brown (10YR 4/2) silt loam; weak, fine, granular and weak, fine, subangular blocky structure; friable; strongly acid; clear, smooth boundary. 4 to 8 inches thick.

B_1 7 to 10 inches, yellowish-brown (10YR 5/4) silty clay loam; few, fine, faint mottles of strong brown (7.5YR 5/6); moderate, medium, blocky structure; firm; strongly acid; clear, wavy boundary. 2 to 5 inches thick.

B_2 10 to 15 inches, yellowish-red (5YR 5/6) silty clay; a few, fine, faint mottles of light brownish gray (2.5Y 6/2); strong, medium, blocky structure; noticeable clay films; firm, sticky and plastic; strongly acid; gradual, smooth boundary. 4 to 8 inches thick.

B_3 15 to 21 inches, variegated red (2.5YR 4/6) and light brownish-gray (2.5Y 6/2) silty clay or clay; strong,

medium and coarse, blocky structure; noticeable clay films; firm, sticky and plastic; strongly acid; gradual, smooth boundary. 4 to 8 inches thick.

C 21 to 30 inches, partly weathered shale and variegated greenish-gray (5GY 6/1) and red (2.5YR 4/6) clay; massive with relict platy structure; firm, sticky and plastic; strongly acid; gradual, wavy boundary. 8 to 16 inches thick.

D_r 30 inches +, slightly weathered, olive-gray clay shale of the Waverly formation and the Mississippian geologic period.

In some places the A_p horizon is pale brown (10YR 6/3) or brown (10YR 4/3). In places there are iron concretions, 8 to 10 inches in diameter, in the C horizon.

Mapped with this soil are small areas in which the B horizon is more yellowish than typical. In these areas the color of the B_1 horizon ranges to pale yellow (2.5Y 7/4), and that of the B_2 horizon, to light olive brown (2.5Y 5/4) or yellowish brown (10YR 5/4). Also included are small areas in which the C horizon is somewhat calcareous but the rest of the solum is strongly acid. In addition, there is a small acreage in which the soil is eroded and the A_p horizon in most places is yellowish-brown or brown (10YR 5/4 to 5/3) silty clay loam.

For Rarden silt loam, 2 to 6 percent slopes, the hazard of erosion is moderate. The root zone is moderately deep over clay shale, and the moisture-supplying capacity is moderately high. Natural fertility is low, but the supply of plant nutrients is fairly easy to build up. Permeability is slow, and the content of organic matter is low. The soil is easy to till. (Capability unit IIIe-14; woodland suitability group 8.)

Rarden silt loam, 6 to 12 percent slopes (RaC).—This is a moderately deep, well drained to moderately well drained soil of uplands. It has a subsoil that is fine textured; the rest of the profile is similar to that of Rarden silt loam, 2 to 6 percent slopes.

Mapped with this soil are a few areas in which the color of the B_1 horizon ranges to pale yellow (2.5Y 7/4), and that of the B_2 horizon, to light olive brown (2.5Y 5/4) or yellowish brown (10YR 5/4). Also included is a small acreage in which the lower part of the C horizon is somewhat calcareous but the rest of the solum is strongly acid.

For Rarden silt loam, 6 to 12 percent slopes, the hazard of erosion is moderately high. The root zone is moderately deep over shale, and the moisture-supplying capacity is moderately high. The soil is low in natural fertility, but the supply of plant nutrients is fairly easy to build up. Permeability is slow, and the content of organic matter is low. The soil is easy to till. (Capability unit IVe-8; woodland suitability group 8.)

Rarden silt loam, 12 to 20 percent slopes (RaD).—This soil is moderately deep and is well drained to moderately well drained. Its profile is similar to that of Rarden silt loam, 2 to 6 percent slopes, except that the D_r horizon is at a depth of 24 to 30 inches.

For Rarden silt loam, 12 to 20 percent slopes, the hazard of erosion is high. The root zone is moderately deep over clay shale, and the moisture-supplying capacity is moderately high. Natural fertility is low, but the supply of plant nutrients is fairly easy to build up. Permeability is slow, and the content of organic matter is low. This soil is easy to till, but its strong slope makes the use of farm machinery difficult. (Capability unit VIe-8; woodland suitability group 8.)

Rarden silty clay loam, 6 to 12 percent slopes, eroded (RcC2).—This is a moderately deep, well drained to moderately well drained soil of uplands. It formed in material weathered from clay shale. The profile is similar to that of Rarden silt loam, 2 to 6 percent slopes, except that the plow layer in most places is yellowish-brown to brown (10YR 5/4 to 5/3) silty clay loam with pockets of grayish-brown (10YR 5/2) silt loam.

Mapped with this soil is a small acreage of a severely eroded soil in which the surface layer in most places is strong-brown (7.5YR 5/6) silty clay. Also included are a few small areas in which the surface layer is grayish-brown silt loam and is only 1 to 2 inches thick. In places there are a few shallow gullies.

For Rarden silty clay loam, 6 to 12 percent slopes, eroded, the hazard of further erosion is high. The root zone is moderately deep over clay shale, and the moisture-supplying capacity is moderately low. The soil is low in natural fertility, but the supply of plant nutrients is fairly easy to build up. Permeability is slow, and the content of organic matter is low. Because of the moderately fine texture of the surface layer, the soil is somewhat difficult to till. (Capability unit IVe-8; woodland suitability group 8.)

Rarden silty clay loam, 12 to 20 percent slopes, eroded (RcD2).—This moderately deep soil of uplands is well drained to moderately well drained. It has a profile similar to that of Rarden silt loam, 2 to 6 percent slopes, except that the surface layer in most places is yellowish-brown (10YR 5/4) silty clay loam mixed with some grayish-brown (10YR 5/2) silt loam.

Mapped with this soil are a few small areas in which the surface layer is a reddish silty clay.

For Rarden silty clay loam, 12 to 20 percent slopes, eroded, the hazard of further erosion is high. The root zone is moderately deep over clay shale, and the moisture-supplying capacity is moderately low. Natural fertility is low, but the supply of plant nutrients is fairly easy to build up. Permeability is slow, and the content of organic matter is low. Tillage is somewhat difficult because of the moderately fine texture of the surface layer. The strong slope also makes the use of farm machinery difficult. (Capability unit VIe-8; woodland suitability group 8.)

Robertsville Series

The Robertsville series consists of poorly drained soils of stream terraces or second bottoms. The soils have a fragipan. Their surface layer is mottled grayish-brown silt loam that overlies mottled light-gray silt loam. The fragipan is at a depth of about 18 inches. The soils formed in general alluvium that washed from soils developed in material weathered from limestone. They are naturally acid, however, as the result of leaching. The soils are nearly level. Some areas are in slight depressions.

These soils are associated with the well drained Elk, the moderately well drained Captina, and the somewhat poorly drained Taft soils. They are more poorly drained than any of the associated soils.

Nearly all of the acreage of Robertsville soils has been cleared. It is used for row crops or pasture.

Robertsville silt loam (0 to 2 percent slopes) (Re).—This is the only Robertsville soil mapped in the county. It is along Slate Creek, where it developed in alluvium

derived from material weathered from limestone. The soil is poorly drained and has a fragipan. The following describes a profile in a moist field along Highway No. 111, 2.4 miles southwest of Wyoming.

A_p 0 to 7 inches, grayish-brown (2.5Y 5/2) silt loam; common, fine, faint mottles of light brownish gray (2.5Y 6/2); weak, fine, subangular and weak, fine, granular structure; friable; slightly acid; abrupt, smooth boundary. 5 to 8 inches thick.

B_g 7 to 18 inches, light-gray (2.5Y 7/2) fine silt loam; common, medium, distinct mottles of strong brown (7.5YR 5/6) and yellowish brown (10YR 5/6); weak to moderate, medium, subangular blocky structure; friable; few, small, dark concretions; slightly acid; clear, smooth boundary. 8 to 12 inches thick.

B_{3m1} 18 to 25 inches, light-gray (2.5Y 7/2) silty clay loam; many, medium, prominent mottles of strong brown (7.5YR 5/8); weak, medium and coarse, blocky structure to massive; firm, compact in place, slightly sticky and slightly plastic; few black concretions one-half inch in diameter; very strongly acid; clear, wavy boundary. 5 to 9 inches thick.

B_{3m2} 25 to 46 inches, strong-brown (7.5YR 5/6) silty clay loam; many, coarse, distinct mottles of light gray (5Y 7/2); weak, coarse, blocky structure to massive; firm, compact in place, slightly sticky and plastic; common, black, irregularly shaped concretions, one-half inch in diameter; strongly acid; clear, smooth boundary. 18 to 30 inches thick.

B_{3mcn} 46 to 50 inches +, same as B_{3m2} horizon, but contains many black concretions of irregular shape.

The deposit of alluvium is normally more than 10 feet thick, but in places it is thinner. Depth to the fragipan ranges from 16 to 22 inches. In a few places there is only a weak fragipan.

This soil is very wet; water stands in the depressions after heavy rains, and tile drainage is generally not feasible. The root zone is shallow over the fragipan, and the moisture-supplying capacity is moderately low. Natural fertility is low, but the soil is easy to till. Permeability is moderate above the fragipan, and the content of organic matter is low. (Capability unit IVw–1.)

Rockcastle Series

The Rockcastle series consists of somewhat excessively drained soils on hillsides. In areas that are not eroded, the surface layer is thin and consists of very dark grayish-brown silt loam that overlies a thin layer of yellowish-brown silt loam. The subsoil is silty clay or clay of variegated colors. These soils formed in material weathered from acid clay shale. They are strongly sloping to steep, and most of the areas are highly dissected.

These soils are associated with the Muskingum and Colyer soils. They are in positions below those occupied by the Muskingum soils and are underlain by clay shale rather than by shattered siltstone and sandstone. Their subsoil is also finer textured than that of the Muskingum soils. In many areas the Rockcastle soils are covered by a thin layer of soil material from the Muskingum soils, deposited as the result of soil creep. The Rockcastle soils are mainly in positions above those occupied by the Colyer soils. They have a finer textured subsoil than the Colyer soils and a lighter color.

The Rockcastle soils are in the mountainous southeastern part of the county and in the area called the Knobs. Most of the acreage is in timber, but some areas have been cleared and used for pasture. A few areas are used for field crops.

Rockcastle silt loam, 12 to 20 percent slopes (RkD).—This shallow, somewhat excessively drained soil has a fine-textured subsoil. The soil is on narrow ridges and hillsides and formed in material weathered from acid, clay shale. The following describes a profile in a moist field along Clark Fork Road, 1 mile west of Pine Grove:

A_{00} ½ inch to 0, scattered leaves and twigs.

A_1 0 to 2 inches, very dark grayish-brown (10YR 3/2) silt loam; weak to moderate, fine, granular structure; friable; very strongly acid; abrupt, wavy boundary. 1 to 3 inches thick.

A_2 2 to 6 inches, yellowish-brown (10YR 5/4) fine silt loam; moderate, fine and medium, subangular blocky structure; friable; very strongly acid; gradual, smooth boundary. 3 to 5 inches thick.

BC 6 to 13 inches, variegated yellowish-brown (10YR 5/4) and strong-brown (7.5YR 5/6) silty clay; strong, medium, blocky structure; noticeable clay films on the surfaces of peds; firm, sticky and plastic; strongly acid; gradual, wavy boundary. 6 to 10 inches thick.

C 13 to 25 inches, variegated light olive-gray (5Y 6/2) and dark yellowish-brown (10YR 4/4), weathered, soft clay shale; massive or relict platy structure; firm, slightly sticky and plastic; strongly acid; gradual, wavy boundary. 10 to 14 inches thick.

D_r 25 inches +, slightly weathered, acid clay shale from the Waverly formation of the Mississippian geologic period.

In places the A_1 horizon is dark grayish brown (10YR 4/2) or brown (10YR 4/3). In some places the A_2 horizon is light yellowish brown (2.5Y 6/4) or pale brown (10YR 6/3). The color of the C horizon ranges to light olive brown (2.5Y 5/4). The BC horizon is discontinuous, and in places the A_2 horizon rests on the C horizon. In some areas the surface layer is thin and consists of silt loam from the Muskingum soils that are in areas above. The texture of these soils varies, but all of the soils have a clayey subsoil. In most places the Rockcastle soils formed in material weathered from clay shale of the Waverly formation, Mississippian geologic period, and are coarser textured than those formed in material weathered from the Crab Orchard clay shale of the Silurian period.

Mapped with this soil is a small acreage in which the soil is cherty and a few small areas in which it is stony. Also included is a small acreage in which the slope is between 6 and 12 percent.

For Rockcastle silt loam, 12 to 20 percent slopes, the hazard of erosion is high. The root zone is shallow over shale, and the moisture-supplying capacity is low. The soil is low in natural fertility. Permeability is slow, and the content of organic matter is low. (Capability unit VIe–8; woodland suitability group 3.)

Rockcastle silt loam, 20 to 30 percent slopes (RkE).—This shallow, somewhat excessively drained soil formed in material weathered from acid clay shale. The soil has stronger slopes than Rockcastle silt loam, 12 to 20 percent slopes, but its profile is similar.

Mapped with this soil is a small acreage in which the soil is stony.

For Rockcastle silt loam, 20 to 30 percent slopes, the hazard of erosion is very high. The root zone is shallow over shale, and the moisture-supplying capacity is low. The soil is low in natural fertility. Permeability is slow, and the content of organic matter is low. (Capability unit VIIe–2; woodland suitability group 3.)

Rockcastle silt loam, 30 to 50 percent slopes (RkF).—This shallow soil is somewhat excessively drained and has a fine-textured subsoil. It is on steep hillsides.

Mapped with this soil is a small acreage in which the soil is eroded and the surface layer in most places is yellowish-brown (10YR 5/4) to brown (10YR 5/3) silty clay. Also included are a few small areas in which the soil is stony.

For Rockcastle silt loam, 30 to 50 percent slopes, the hazard of erosion is very high. The root zone is shallow over shale, and the moisture-supplying capacity is low. Natural fertility is low. Permeability is slow and the content of organic matter is low. The soils are too steep for the use of farm machinery. (Capability unit VIIe-2; woodland suitability group 3.)

Rockcastle silty clay, 12 to 20 percent slopes, eroded (RsD2).—This fine textured, shallow soil is somewhat excessively drained. It is on uplands and formed in material weathered from acid clay shale. The profile of this soil is similar to that of Rockcastle silt loam, 12 to 20 percent slopes. The surface layer in most places, however, is yellowish-brown (10YR 5/4) to brown (10YR 5/3) silty clay loam and is only 4 to 6 inches thick. In places part of the A_p horizon consists of a layer of dark grayish-brown silt loam that is 1 to 2 inches thick. Depth to the D_r horizon ranges from 15 to 20 inches.

Mapped with this soil are a few small areas in which the soil is stony. Also included is a small acreage in which the soil is eroded and has slopes of 6 to 12 percent.

For Rockcastle silty clay, 12 to 20 percent slopes, eroded, the hazard of further erosion is high. The root zone is shallow over shale, and the moisture-supplying capacity is very low. The soil is low in natural fertility. Permeability is slow, and the content of organic matter is very low. (Capability unit VIIs-3; woodland suitability group 2.)

Rockcastle silty clay, 20 to 30 percent slopes, eroded (RsE2).—This shallow, somewhat excessively drained soil is on hillsides. Its profile is similar to that of Rockcastle silt loam, 12 to 20 percent slopes, but the surface layer is only 4 to 6 inches thick and in most places is yellowish-brown (10YR 5/4) to brown (10YR 5/3) silty clay. In places the surface layer is only 1 to 2 inches thick and is dark grayish-brown silt loam. Depth to the D_r horizon ranges from 13 to 20 inches.

Mapped with this soil are a few small areas in which the soil is stony.

For Rockcastle silty clay, 20 to 30 percent slopes, eroded, the hazard of further erosion is very high. The root zone is very shallow over shale, and the moisture-supplying capacity is very low. The soil is low in natural fertility. Permeability is slow, and the content of organic matter is very low. (Capability unit VIIs-3; woodland suitability group 2.)

Rock Land

Rock land (Rt).—This miscellaneous land type consists of areas in which rock outcrops or patches of soil that are shallow over rock make up from 25 to 90 percent of the acreage. The oucrops or underlying rocks are limestone in some places, and in other places they are acid sandstone or siltstone. In still other places there are outcrops of calcareous shale or of acid shale. (Capability unit VIIs-5; woodland suitability group 10.)

Sees Series

The Sees series consists of deep, somewhat poorly drained to moderately well drained soils on toe slopes or alluvial fans. The soils have a surface layer of very dark grayish-brown silty clay loam and a subsoil of mottled olive-brown to light olive-brown silty clay. They formed in local alluvium washed from the Otway, Fairmount, and other soils that developed in fine-textured alkaline material. The soils are gently sloping to sloping.

These soils are in positions below those occupied by the Woolper soils on toe slopes and above those occupied by the Dunning and Egam soils on first bottoms. The Sees soils are less well drained than the Woolper and Egam soils, and they have a more mottled subsoil than those soils. They are better drained than the Dunning soils.

The Sees soils are in the limestone valleys near Owingsville. Nearly all of the acreage has been cleared and is used for hay and row crops.

Sees silty clay loam, 2 to 6 percent slopes (SaB).—This is a somewhat poorly drained to moderately well drained, fine-textured soil on low toe slopes. The soil formed in material weathered from limestone. The following describes a profile in a moist field along Highway No. 36, near the bridge across Slate Creek:

A_p 0 to 6 inches, very dark grayish-brown (10YR 3/2) silty clay loam; moderate, medium and fine, subangular blocky structure; friable to firm; slightly acid; clear, smooth boundary. 5 to 8 inches thick.

B_2 6 to 18 inches, olive-brown (2.5Y 4/4) silty clay; many, medium, faint mottles of dark brown (7.5YR 3/2) and strong brown (7.5YR 5/6); strong, fine and medium, blocky structure; pronounced clay films; very firm, sticky and plastic; mildly alkaline; clear, smooth boundary. 10 to 36 inches thick.

B_3 18 to 24 inches, light olive-brown (2.5 5/4) silty clay; many, medium, faint mottles of dark brown (10YR 4/3); strong, fine and medium, blocky structure; few clay films; firm, plastic; neutral; gradual, smooth boundary. 6 to 14 inches thick.

C 24 to 48 inches +, yellowish-brown (10YR 5/4) silty clay; many, medium, faint, brown (10YR 4/3) mottles; strong, fine and medium, blocky structure; firm, plastic; few, medium-sized, soft, black concretions; mildly alkaline.

In some places the A_p horizon is very dark gray (10YR 3/1) or brown (10YR 4/3). In places there is a thin layer of very dark grayish-brown (10YR 3/2) soil material in the B horizon. In some areas the dominant color of the B horizon is dark brown. The B_3 horizon is somewhat compact in places.

For this soil, the hazard of erosion is moderately low. The soil is moderately to slightly wet, but tile can be used to improve drainage. The root zone is deep, and the moisture-supplying capacity is high. The soil is high in natural fertility, but it is somewhat difficult to till because of the moderately fine texture of the plow layer. Permeability is moderately slow. The content of organic matter is medium to high. (Capability unit IIw-3.)

Sees silty clay loam, 6 to 12 percent slopes (SaC).—This moderately well drained to somewhat poorly drained soil is dark colored and fine textured. It formed in material weathered from limestone. The soil is on toe slopes. It has stronger slopes and is slightly better drained than

Sees silty clay loam, 2 to 6 percent slopes, but its profile is similar to the profile of that soil.

Mapped with this soil is a small acreage in which the soil is eroded and has a surface layer that is dark yellowish brown or dark grayish brown.

For Sees silty clay loam, 6 to 12 percent slopes, the hazard of erosion is moderate. The soil is slightly to moderately wet, but tile can be used to improve drainage. The root zone is deep, and the moisture-supplying capacity is high. The soil is high in natural fertility, but it is somewhat difficult to till because of the moderately fine texture of the plow layer. Permeability is moderately slow, and the content of organic matter is medium to high. (Capability unit IIIe-8.)

Sequatchie Series

The Sequatchie series consists of deep, medium-textured to moderately coarse textured nearly level, well-drained soils on low-lying stream terraces. No soils typical of the series have been mapped in the county, but one soil has been mapped as a fine-textured variant of this series. This variant has a surface layer of dark-brown silty clay loam. Its subsoil is brown silty clay to silty clay loam. It formed in general alluvium washed from soils that developed primarily in material weathered from sandstone and shale. In some places the soil formed in areas that are covered at times by slack water.

This soil occurs in association with the Whitwell and Atkins soils. It is in positions slightly higher than those occupied by the Whitwell and Atkins soils, and it is better drained than those soils.

All of the acreage has been cleared. It is used to grow tobacco, corn, and hay crops.

Sequatchie silty clay loam, heavy variant, 0 to 4 percent slopes (ScA).—This is the only Sequatchie soil mapped in Bath County, and it is finer textured throughout than typical for the series. This soil occurs in fairly large areas on low terraces along Salt Lick Creek. It is one of the most productive soils in the county, and it is flooded less frequently than the adjacent soils.

This soil is well drained. It is fine textured and developed in alluvium derived primarily from sandstone and shale. The following describes a profile in a moist field along Highway No. 211, 0.5 of a mile north of U.S. Highway No. 60.

A_p 0 to 8 inches, dark-brown (10YR 4/3) light silty clay loam; weak, fine, granular and fine, subangular blocky structure; friable, slightly sticky and slightly plastic; very strongly acid; clear, smooth boundary. 6 to 9 inches thick.

B_{21} 8 to 22 inches, brown (7.5YR 5/4) silty clay to silty clay loam; strong, medium, blocky structure; very firm, sticky and plastic; dark yellowish-brown silty clay loam coatings on the surfaces of some peds; extremely acid; gradual, smooth boundary. 10 to 14 inches thick.

B_{22} 22 to 32 inches, strong-brown (7.5YR 5/6) silty clay; a few, fine, faint mottles of light yellowish brown (10YR 6/4); strong, medium, blocky structure; noticeable clay films on peds; very firm, sticky and plastic; extremely acid; clear, wavy boundary. 8 to 12 inches thick.

C_1 32 to 47 inches, yellowish-brown (10YR 5/4) silty clay; common, fine and medium, distinct mottles of pale yellow (2.5Y 7/4) and dark yellowish brown (10YR 4/4); strong, medium and coarse, blocky structure; very firm, sticky and plastic; extremely acid; clear, wavy boundary. 14 to 16 inches thick.

In places the color of the A_p horizon ranges to dark grayish brown (10YR 4/2) or brown (10YR 5/3), and that of the B horizons, to yellowish brown (10YR 5/6 to 5/4) or brown (10YR 4/3). In a few areas the texture of the B horizons is silty clay loam.

For this soil, there is no hazard of erosion. The soil is not wet. The root zone is deep, and the moisture-supplying capacity is very high. Natural fertility is moderately high, and the supply of plant nutrients is easy to build up. Permeability is moderate in the upper part of the solum, and moderately slow in the lower part. The content of organic matter is medium. The soil is easy to till. (Capability unit IIs-3.)

Shelbyville Series

The Shelbyville series consists of soils that are deep and well drained. The soils are on uplands. In areas that are not eroded, the surface layer is dark-brown silt loam, and the subsoil is brown, dark-brown, and strong-brown silty clay loam. A concretionary layer is at a depth of about 28 inches. The soils formed in material weathered from interbedded siltstone and limestone, but they are naturally acid as the result of leaching. They are gently sloping to sloping.

The Shelbyville soils are associated with the Nicholson soils and are on flats above the Lowell soils. They have a somewhat browner subsoil than the Nicholson soils and have a concretionary zone rather than a fragipan. The Shelbyville soils have a coarser textured subsoil than the Lowell soils and a more pronounced concretionary layer.

The Shelbyville soils are near Bethel and Sharpsburg. They are among the most productive soils in the county. All of the acreage has been cleared and is used to grow tobacco and hay.

Shelbyville silt loam, 2 to 6 percent slopes (SeB).—This deep, well-drained soil developed in material weathered from interbedded siltstone and limestone. It has a pronounced concretionary zone at a depth of about 28 inches. The following describes a profile in a moist field along Ratliff road, 0.4 of a mile south of Highway No. 36:

A_p 0 to 10 inches, dark-brown (7.5YR 3/2 to 10YR 3/3) silt loam; moderate, fine and medium, granular structure; friable; slightly acid; clear, smooth boundary. 8 to 12 inches thick.

B_1 10 to 16 inches, brown (10YR 4/3 to 7.5YR 4/4) coarse silty clay loam; moderate, fine and medium, subangular blocky structure; friable; slightly acid; clear, smooth boundary. 5 to 9 inches thick.

B_{21} 16 to 22 inches, dark-brown (7.5YR 4/4) silty clay loam; moderate, fine and medium, blocky structure; noticeable clay films; firm; slightly acid; clear, smooth boundary. 4 to 8 inches thick.

B_{22} 22 to 28 inches, strong-brown (7.5YR 5/6) to dark yellowish-brown (10YR 4/4) silty clay loam; moderate, medium, blocky structure; noticeable clay films; few, soft, black concretions of irregular shape; firm; slightly acid; clear, smooth boundary. 7 to 12 inches thick.

B_{3cn} 28 to 33 inches, yellowish-brown (10YR 5/4 to 5/6) silty clay; few, medium, faint mottles of light olive brown (2.5Y 5/4); moderate, medium and coarse, blocky structure; pronounced clay films; firm, sticky and plastic; abundant, soft, dark concretionary material; common, small, round, black concretions; slightly acid; gradual, smooth boundary. 4 to 12 inches thick.

C 35 to 46 inches, light olive-brown (2.5Y 5/4) clay; medium, coarse, blocky structure; very firm, sticky

and plastic; abundant, soft, concretionary material of dark reddish brown, and the faces of some peds are coated with black material; slightly acid. 10 to 20 inches thick.

D_r 46 inches +, interbedded siltstone and limestone of the Garrard formation, Ordovician geologic period.

In some places the surface layer has been changed as the result of activities of the Indians. The A_p horizon is dark brown (10YR 3/3) in such areas and is about 8 inches thick; in addition, there is an A_2 horizon of brown (10YR 4/3) silt loam, about 7 inches thick.

Mapped with this soil are many small areas in which the slope is 0 to 2 percent. Also included is a small acreage in which the soil is eroded.

For Shelbyville silt loam, 2 to 6 percent slopes, the hazard of erosion is moderately low. The root zone is deep, and the moisture-supplying capacity is very high. Natural fertility is high. Permeability is moderate, and the content of organic matter is medium. The soil is easy to till. (Capability unit IIe–1.)

Shelbyville silt loam, 6 to 12 percent slopes (SeC).—This is a deep, well-drained soil developed in material weathered from interbedded siltstone and limestone. It has a pronounced concretionary zone at a depth of about 28 inches. The profile is similar to the profile of Shelbyville silt loam, 2 to 6 percent slopes.

Mapped with this soil is a small acreage of a Nicholson silt loam that has slopes of 6 to 12 percent.

For Shelbyville silt loam, 6 to 12 percent slopes, the hazard of erosion is moderate. The root zone is deep, and the moisture-supplying capacity is very high. The soil is high in natural fertility. Permeability is moderate, and the content of organic matter is medium. The soil is easy to till. (Capability unit IIIe–1.)

Shelbyville silt loam, 6 to 12 percent slopes, eroded (SeC2).—This deep, well-drained soil developed in material weathered from interbedded siltstone and limestone. It has a pronounced concretionary zone at a depth of about 24 inches. The profile is similar to that of Shelbyville silt loam, 2 to 6 percent slopes, except that the A_p horizon is thinner, lighter colored, and slightly finer textured.

Mapped with this soil is a small acreage of a Nicholson silt loam that is eroded and has slopes of 6 to 12 percent.

For Shelbyville silt loam, 6 to 12 percent slopes, eroded, the hazard of further erosion is moderate. The root zone is deep, and the moisture-supplying capacity is very high. The soil is high in natural fertility. Permeability is moderate, and the content of organic matter is medium to low. The soil is easy to till. (Capability unit IIIe–1.)

Shrouts Series

The Shrouts series consists of shallow soils that are fine textured and somewhat excessively drained to excessively drained. The soils are on narrow ridges and on side slopes in the uplands. In areas that are not eroded, the surface layer is thin and is a dark grayish-brown silty clay loam. The subsoil is olive-gray clay and has a strong, prismatic structure. The soils formed in material weathered from calcareous, soft clay shale. The shale is from the upper part of the Crab Orchard formation of Silurian geologic age and contains magnesium sulfate. The surface layer of these soils ranges from mildly alkaline to medium acid in reaction. The slope ranges from 6 to 30 percent.

These soils are associated with the Colyer soils, but they are in positions below those occupied by the Colyer soils. In a few areas they are associated with the Rockcastle soils. The Shrouts soils are finer textured and have a much grayer subsoil than the Colyer soils, and they are also more alkaline. In places the Shrouts soils have a slightly darker surface layer and a finer texture than the Rockcastle soils, and they are also more alkaline. In addition, the upper part of the subsoil is olive gray rather than yellowish brown, and the soils have a prismatic structure.

The Shrouts soils are in positions above those occupied by the Otway soils with which they are associated in places. They have a lighter colored surface layer and a finer textured subsoil than the Otway soils. They also have a prismatic structure and a more acid surface layer; they do not have the pockets of sandy material that are common in the Otway soils.

The Shrouts soils are in areas near Owingsville. They are also in areas just south of Olympia, and these areas extend northward to Peasticks. Part of the acreage has been cleared and is used for pastures of tall fescue, which produce fair yields. Much of the acreage is covered by scrub oak and Virginia pine, but there are a few scattered stands of cedar.

Shrouts silty clay loam, 6 to 20 percent slopes (SsD).—This shallow, somewhat excessively drained soil developed in material weathered from calcareous clay shale. The following describes a profile in a moist field along U.S. Highway No. 60, 4 miles east of Owingsville and 0.9 of a mile east of Shrouts School, across from Goodpastor Furniture Store:

A_p 0 to 5 inches, dark grayish-brown (2.5Y 4/2) silty clay loam; moderate, fine, granular and fine, blocky structure; firm, slightly sticky and slightly plastic; neutral; clear, wavy boundary. 4 to 6 inches thick.

B_2 5 to 14 inches, olive-gray (5Y 5/2 to 4/2) clay; common, medium, distinct variegations of light olive brown (2.5Y 5/6); strong, coarse, prismatic structure; thick, continuous clay films on peds; very firm, sticky and plastic; few, dark-brown splotches from roots; few iron concretions one-fourth inch in diameter and of irregular shape; neutral; gradual, smooth boundary. 8 to 12 inches thick.

C 14 to 24 inches, gray (5Y 5/1) clay; few, fine, distinct, olive variegations; (5Y 5/6); weak, coarse, blocky structure to massive; very firm, sticky and plastic; moderately alkaline to calcareous; clear, smooth boundary. 8 to 12 inches thick.

D_r 24 inches +, olive-gray calcareous shale from the Crab Orchard formation of the Silurian geologic period.

In a few small areas, the color of the A_p horizon ranges to grayish brown (10YR 4/2) or dark gray (10YR 4/1). The color of the B_2 horizon ranges to gray (5Y 5/1), and the structure, from strong prismatic to moderate prismatic that breaks to moderate, medium blocky. The solum ranges from 10 to 15 inches in thickness. In places the reaction of the B_2 horizon ranges from moderately alkaline to strongly acid within short distances.

Mapped with this soil are a few small areas in which the slope is 2 to 6 percent.

For Shrouts silty clay loam, 6 to 20 percent slopes, the hazard of erosion is high. The root zone is shallow over shale, and the moisture-supplying capacity is low. Natural fertility is low, but the supply of plant nutrients is fairly easy to build up. Permeability is slow, and the content of organic matter is medium to low. The soil is somewhat difficult to till because of the moderately fine

texture of the surface layer. The strong slope also makes the use of farm machinery difficult. (Capability unit VIe–8; woodland suitability group 10.)

Shrouts clay, 6 to 20 percent slopes, eroded (ShD2).—This shallow, fine-textured soil is excessively drained. It formed in material weathered from strongly alkaline clay shale. The profile of this soil is similar to that of Shrouts silty clay loam, 6 to 20 percent slopes, except that the A_p horizon is dominantly olive-gray (5Y 5/2 to 4/2) clay rather than dark grayish-brown silty clay loam.

Mapped with this soil is a small acreage in which the slope is 2 to 6 percent.

For Shrouts clay, 6 to 20 percent slopes, eroded, the hazard of further erosion is very high. The root zone is shallow over shale, and the moisture-supplying capacity is very low. Natural fertility is low. Permeability is slow, and the content of organic matter is low to very low. (Capability unit VIIs–3; woodland suitability group 10.)

Shrouts clay, 20 to 30 percent slopes, eroded (ShE2).—This is a shallow, excessively drained soil that formed in material weathered from strongly alkaline clay shale. The profile is similar to that of Shrouts silty clay loam, 6 to 20 percent slopes, except that the A_p horizon is dominantly olive-gray (5Y 5/2 to 4/2) clay.

For this soil, the hazard of further erosion is very high. The root zone is shallow over shale, and the moisture-supplying capacity is very low. Natural fertility is low. Permeability is slow, and the content of organic matter is low to very low. (Capability unit VIIs–3; woodland suitability group 10.)

Stendal Series

The Stendal series consists of naturally acid, somewhat poorly drained, nearly level soils of first bottoms. The surface layer of these soils is dark grayish-brown to olive-brown silt loam. Below the surface layer is mottled olive-brown silt loam that grades to gray at a depth of about 16 inches. Recent alluvium is the material in which the soils formed. The alluvium washed from soils that formed in material weathered from acid siltstone, sandstone, and shale.

These soils are associated with the well drained Pope, the moderately well drained Philo, and the poorly drained Atkins soils. They are less well drained than the Pope and Philo soils, but they are better drained than the Atkins soils.

Most of the acreage of Stendal soils has been cleared. It is mainly in row crops or hay, but some areas are idle or in trees.

Stendal silt loam (0 to 2 percent slopes) (St).—This is the only Stendal soil mapped in the county. It is on first bottoms in the southeastern part of the county. The soil developed in recent alluvium derived from acid sandstone, siltstone, and shale. The following describes a profile in a moist field near the junction of Highways No. 36 and 211:

A_p 0 to 6 inches, dark grayish-brown (2.5Y 4/2 or 10YR 4/2) to olive-brown (2.5Y 4/4) silt loam; moderate, fine, crumb structure; very friable; strongly acid; clear, smooth boundary. 5 to 8 inches thick.

C_1 6 to 16 inches, olive-brown (2.5Y 4/4) silt loam; common, medium, distinct, olive (5Y 5/3) mottles and a few, fine, distinct, dark reddish-brown (5YR 3/4) mottles; weak, fine, crumb and weak, fine, subangular blocky structure; very friable; very strongly acid; gradual, wavy boundary. 8 to 12 inches thick.

C_{2g} 16 to 24 inches, olive-gray (5Y 5/2) silt loam; common, fine, distinct mottles of yellowish red (5YR 4/6) and brown (7.5YR 4/4); massive; very friable; very strongly acid; gradual, wavy boundary. 6 to 10 inches thick.

C_{3g} 24 to 44 inches, light olive-gray (5Y 6/2) silt loam; common, medium, distinct mottles of dark brown (7.5YR 4/4); massive; very friable; very strongly acid; gradual, wavy boundary. 16 to 24 inches thick.

C_{4g} 44 inches +, gray (N 5/0 to 5Y 5/1) silt loam; common, fine, distinct mottles of dark brown (7.5YR 4/4) and yellowish red (5YR 4/6); massive; friable; very strongly acid.

In places the C_1 horizon is pale brown (10YR 6/3) to light brownish gray (10YR 6/2).

Mapped with this soil is a small acreage of a Cotaco gravelly loam and of a Cotaco loam (not mapped separately in this county). Also included is a small acreage of a soil formed in colluvium or local alluvium, and a small acreage of a Stendal fine sandy loam.

Stendal silt loam is moderately wet, but tile can be used to improve drainage to some extent. The root zone is deep, and the moisture-supplying capacity is very high. Natural fertility is moderate, but the supply of plant nutrients is fairly easy to build up. Permeability is moderately rapid to moderate, and the content of organic matter is low. The soil is easy to till. (Capability unit IIw–4.)

Taft Series

The Taft series consists of nearly level, somewhat poorly drained soils of stream terraces or second bottoms. The soils have a fragipan at a depth of about 19 inches. Their subsoil, a light yellowish-brown silt loam, is underlain by a subsoil of mottled pale-brown to light olive-gray silt loam. These soils formed in general alluvium washed from soils that developed in material weathered from limestone. They are naturally acid, however, as the result of leaching.

These soils occur in association with the well drained Elk, the moderately well drained Captina, and the poorly drained Robertsville soils. They are less well drained than the Elk and Captina soils and are better drained than the Robertsville soils.

Nearly all of the acreage of Taft soils has been cleared. It is now in field crops, pasture, or hay crops of good quality.

Taft silt loam (0 to 2 percent slopes) (Ta).—This is the only Taft soil mapped in the county, and it occurs on stream terraces along Slate Creek. The soil is somewhat poorly drained and developed in alluvium derived from limestone. The following describes a profile in a moist field along Highway No. 111, 3.7 miles north of Owingsville:

A_p 0 to 8 inches, light yellowish-brown (10YR 6/4) silt loam; few, fine, faint mottles of light brownish gray (10YR 6/2); moderate, fine, granular structure; friable; strongly acid; clear, smooth boundary. 6 to 10 inches thick.

B_1 8 to 14 inches, pale-brown (10YR 6/3) silt loam; common, fine, distinct mottles of strong brown (7.5YR 5/8), yellowish brown (10YR 5/8), and light gray (10YR 7/1); moderate, fine and medium, subangular blocky structure; friable; few, small, soft, black concretions; strongly acid; clear, smooth boundary. 4 to 8 inches thick.

B_{2g} 14 to 19 inches, light olive-gray (5Y 6/2) silt loam; common, fine, distinct mottles of light brownish gray (10YR 6/2) and strong brown (7.5YR 5/6); moderate, medium, subangular blocky structure; friable; few, small, black concretions; strongly acid; gradual, smooth boundary. 4 to 8 inches thick.

B_{3m1} 19 to 28 inches, pale-olive (5Y 6/3) silty clay loam; many, medium, distinct mottles of strong brown (7.5YR 5/6), yellowish brown (10YR 5/4), and gray (N 5/0); moderate, medium, blocky structure; firm, compact in place, slightly plastic; few, medium-sized, soft, black and brown concretions; very strongly acid; gradual, smooth boundary. 7 to 14 inches thick.

B_{3m2} 28 to 47 inches, light olive-gray (5Y 6/2) silty clay loam to silty clay; common, fine, distinct mottles of strong brown (7.5YR 5/6); massive to weak, coarse, angular blocky structure; firm, compact in place, sticky and plastic; many, medium-sized, soft, black and brown concretions; very strongly acid; gradual, smooth boundary. 8 to 25 inches thick.

C 47 inches +, light-gray to gray (N 6/0) silty clay; common, medium, prominent mottles of dark yellowish brown (10YR 4/4); massive; very firm, sticky and plastic; common, medium and coarse, soft, brown and black concretions; very strongly acid.

The color of the A_p horizon ranges to grayish brown (10 YR 5/2) in places. Depth to the fragipan ranges from about 16 to 24 inches. In many places the C horizon contains pockets of waterworn gravel and chert. The thickness of the underlying alluvium ranges from about 6 feet to more than 10 feet.

This soil is moderately wet; water stands in the depressions after heavy rains, and tile drainage is generally not feasible. The root zone is shallow over the fragipan. The moisture-supplying capacity is moderately high. Natural fertility is moderately low, but the supply of plant nutrients is fairly easy to build up. Permeability is moderate above the fragipan, and the content of organic matter is low. The soil is easy to till. (Capability unit IIIw-1.)

Terrace Escarpments

Terrace escarpments (Tc).—This miscellaneous land type is made up of steep terrace escarpments along streams. The soil materials in these areas vary in texture and in other characteristics so that it was not feasible to classify them by soil types. The degree of erosion also varies.

Most areas of terrace escarpments are now idle or are in mixed hardwoods. A few areas are used for crops or pasture. (Capability unit VIe-1.)

Tilsit Series

The Tilsit series consists of moderately well drained soils on flats in the uplands. The soils have a fragipan at a depth of about 22 inches. Their surface layer, a very dark grayish-brown to brown silt loam, overlies a subsoil of yellow silt loam. The soils formed in material weathered from acid shale, sandstone, and siltstone. They are naturally acid and are gently sloping to sloping.

These soils occur in association with the somewhat poorly drained Johnsburg and poorly drained Mullins soils. They are better drained than the soils of either the Johnsburg or Mullins series.

The Tilsit soils are in the southern part of the county, in the outer part of the area called the Knobs. About two-thirds of the acreage has been cleared and is in row crops or pasture. The rest is still in mixed hardwoods.

Tilsit silt loam, 2 to 6 percent slopes (TsB).—This moderately well drained soil of uplands has a fragipan. The soil formed in material weathered from acid shale, siltstone, and sandstone. The following describes a profile in a moist field along an old State road, 0.2 of a mile west of Olympia Springs:

A_0 1 inch to 0, partly decomposed leaves and roots.

A_1 0 to 3 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine, granular structure; very friable; slightly acid; clear, wavy boundary. 2 to 4 inches thick.

A_2 3 to 6 inches, yellowish-brown to light yellowish-brown (10YR 5/4 to 6/4) silt loam; weak, fine, subangular and moderate, fine, granular structure; very friable; very strongly acid; clear, smooth boundary. 2 to 5 inches thick.

B_1 6 to 18 inches, yellow (10YR 7/6) silt loam; moderate, fine and medium, subangular blocky structure; friable; very strongly acid; clear, smooth boundary. 10 to 14 inches thick.

B_2 18 to 22 inches, yellow (10YR 7/6) silt loam; moderate, medium, blocky structure; friable; very strongly acid; abrupt, smooth boundary. 3 to 6 inches thick.

B_{3m} 22 to 46 inches, light-gray (2.5Y 7/2) silty clay loam; many, medium, distinct mottles of brownish yellow (10YR 6/8) and yellow (10YR 7/8); weak, coarse, blocky structure to massive; firm, compact in place; very strongly acid; clear, smooth boundary. 20 to 30 inches thick.

C 46 to 54 inches, variegated yellowish-brown (10YR 5/8) and light olive-gray (5Y 6/2) silty clay loam or silty clay; relict platy structure; massive; firm, slightly sticky and slightly plastic; small pieces of weathered shale are common; strongly acid; clear, smooth boundary. 6 to 10 inches thick.

D_r 54 inches +, interbedded siltstone or fine-grained sandstone and clay shale from the Waverly formation of the Mississippian geologic period.

In places the plow layer is dark grayish brown to brown (10YR 4/2 to 4/3). The B_1 horizon, in some places, is light olive brown (2.5Y 5/4) or brownish yellow (10YR 6/6). The color of the B_2 horizon ranges to yellowish brown (10YR 5/6). In places the texture of the fragipan is silt loam. Depth to the fragipan ranges from about 17 to 23 inches.

Mapped with this soil is a small acreage in which there is no fragipan and weathered shale is at a depth of about 20 inches. Also included is a small acreage in which the slope is 0 to 2 percent.

For Tilsit silt loam, 2 to 6 percent slopes, the hazard of erosion is moderately low. The soil is slightly wet, but tile drainage is not feasible. The root zone is moderately deep over the fragipan, and the moisture-supplying capacity is moderately high. Natural fertility is moderately low, but the supply of plant nutrients is easy to build up and the soil is easy to till. Above the fragipan, permeability is moderate. The content of organic matter is low. (Capability unit IIe-7.)

Tilsit silt loam, 6 to 12 percent slopes (TsC).—This moderately well drained soil of uplands has a fragipan. The soil formed in material weathered from acid shale, siltstone, and sandstone. Its profile is similar to that of Tilsit silt loam, 2 to 6 percent slopes.

Mapped with this soil is a small acreage in which the soil is eroded and has a surface layer that in most places is yellowish-brown (10YR 5/4) silt loam. Also included is a small acreage in which there is no fragipan and weathered shale is at a depth of about 20 inches.

For Tilsit silt loam, 6 to 12 percent slopes, the hazard of erosion is moderate. The soil is slightly wet. The root zone is moderately deep over the fragipan, and the moisture-supplying capacity is moderately high. Natural fertility is low, but the supply of plant nutrients is easy to build up and the soil is easy to till. Permeability is moderate above the fragipan. The content of organic matter is low. (Capability unit IIIe–9.)

Trappist Series

The Trappist series consists of moderately deep, well-drained soils of uplands. In areas that are not eroded, the surface layer is dark-brown silt loam and the subsoil is strong-brown to reddish-brown silty clay loam to silty clay. The soils formed in material weathered from black fissile shale. They are naturally acid and are gently sloping to strongly sloping.

These soils occur in association with the Colyer soils, which formed in the same kind of parent material. They are deeper and have a better developed profile than the Colyer soils. The Trappist soils are similar to the Muse soils, but they are shallower and formed in material weathered from shale rather than in local alluvium.

The Trappist soils are in the part of the county underlain by black shale. About two-thirds of the acreage has been cleared and is used for row crops or pasture.

Trappist silt loam, 2 to 6 percent slopes (TfB).—This well-drained, moderately deep soil formed in material weathered from black fissile shale. The following describes a profile in a moist field along Stulltown Road 2.6 miles south of Preston:

A_p 0 to 6 inches, dark-brown (10YR 3/4) silt loam with streaks of dark yellowish brown (10YR 4/4); weak, fine, granular and weak, fine, subangular blocky structure; friable; strongly acid; abrupt, smooth boundary. 4 to 8 inches thick.

B_1 6 to 14 inches, yellowish-brown (10YR 5/4) fine silt loam or silty clay loam; weak, fine, subangular blocky structure; friable; few pieces of black fissile shale; very strongly acid; clear, smooth boundary. 5 to 10 inches thick.

B_2 14 to 31 inches, strong-brown (7.5YR 5/8) fine silty clay loam; a few, fine, faint variegations of light brown (7.5YR 6/4) and red (2.5YR 4/6); moderate, medium, blocky structure; firm, slightly sticky and slightly plastic; bits of reddish-colored, weathered shale are common; very strongly acid; gradual, smooth boundary. 14 to 24 inches thick.

C 31 to 35 inches, strong-brown (7.5YR 5/6) silty clay and weathered shale that is variegated light brown (7.5YR 6/4) and dark brown (10YR 4/3); massive; firm, slightly sticky and plastic; extremely acid; gradual, wavy boundary. 3 to 8 inches thick.

D_r 35 inches, black fissile shale of the Devonian and Mississippian geologic periods with discontinuous lenses of reddish clay in upper part.

In most places depth to black shale is no more than 36 inches. In places the A_p horizon is dark grayish brown (10YR 4/2) or very dark grayish brown (10YR 3/2). In areas that are wooded, the A horizon is as much as 10 inches thick and consists of an A_1 and A_2 horizon. In some places the color of the B horizon ranges from yellowish brown (10YR 5/4) to yellowish red (5YR 5/6). In some profiles there is a B_{21} horizon of silty clay loam and a B_{22} horizon of silty clay.

Mapped with this soil is a small acreage of an eroded Muse silt loam that has slopes of 2 to 6 percent. Also included are small areas in which the Muse soil is not eroded.

For Trappist silt loam, 2 to 6 percent slopes, the hazard of erosion is moderately low. The root zone is moderately deep over shale, and the moisture-supplying capacity is high. Natural fertility is moderately low, but the supply of plant nutrients is fairly easy to build up. Permeability is moderate, and the content of organic matter is medium to low. The soil is easy to till. (Capability unit IIe–9; woodland suitability group 8.)

Trappist silt loam, 6 to 12 percent slopes, eroded (TfC2).—This is a well-drained, moderately deep soil of the uplands. It formed in material weathered from black fissile shale. The profile of this soil is similar to that of Trappist silt loam, 2 to 6 percent slopes, but the A_p horizon is thinner and is brown (10YR 4/3) to dark yellowish brown (10YR 4/4).

Mapped with this soil are a few small areas in which the soil is not eroded and resembles Trappist silt loam, 2 to 6 percent slopes. Also included are small areas in which the soil is severely eroded and the plow layer is yellowish-brown to strong-brown silty clay loam.

For Trappist silt loam, 6 to 12 percent slopes, eroded, the hazard of further erosion is moderate. The root zone is moderately deep over shale, and the moisture-supplying capacity is moderately high. Natural fertility is moderately low, but the supply of plant nutrients is easy to build up. Permeability is moderate and the content of organic matter is low. The soil is easy to till. (Capability unit IIIe–7; woodland suitability group 8.)

Trappist silt loam, 12 to 20 percent slopes, eroded (TfD2).—This well-drained, moderately deep soil formed in material weathered from black fissile shale. Its profile is similar to that of Trappist silt loam, 2 to 6 percent slopes, but the A horizon is thinner and lighter colored.

Mapped with this soil are small areas in which the soil is not eroded and the profile is like that of Trappist silt loam, 2 to 6 percent slopes. Also included are small areas in which the soil is severely eroded and the plow layer is strong-brown to reddish-brown silty clay loam.

For Trappist silt loam, 12 to 20 percent slopes, eroded, the hazard of further erosion is high. The root zone is moderately deep over shale, and the moisture-supplying capacity is moderately high. Natural fertility is moderately low, but the supply of plant nutrients is fairly easy to build up. Permeability is moderately slow, and the content of organic matter is low. The soil is easy to till, but the strong slopes make the use of farm machinery difficult. (Capability unit IVe–4; woodland suitability group 8.)

Tyler Series

The Tyler series consists of nearly level, somewhat poorly drained soils on old, high stream terraces and on normal stream terraces or second bottoms. The soils have a fragipan at a depth of about 16 inches. Their A horizons are gray to dark gray or brown, and they have a texture of silt loam or fine sandy loam. The subsoil is mottled light yellowish brown. The soils formed in old stream alluvium washed from soils that developed in material weathered from acid sandstone and shale. They are strongly acid.

These soils occur in association with the moderately well drained Monongahela and the poorly drained Purdy soil. They are more poorly drained than the Monongahela soils, but they are better drained than the Purdy soils.

The Tyler soils are near Peasticks and along the Licking River and Salt Lick Creek. About two-thirds of the acreage has been cleared and is used to grow row crops and hay.

Tyler fine sandy loam (0 to 2 percent slopes) (Tv).—This somewhat poorly drained soil of stream terraces has a fragipan. The soil developed in alluvium derived from sandstone. The following describes a profile in a moist field:

A_1 0 to 3 inches, dark-gray (10YR 4/1) to gray (10YR 5/1) fine sandy loam; weak, fine, granular structure; very friable; very strongly acid; clear, smooth boundary. 2 to 4 inches thick.

A_2 3 to 7 inches, pale-brown (10YR 6/3) fine sandy loam; few, fine, faint mottles of yellowish brown (10YR 5/8); weak, fine, platy structure; friable; very strongly acid; clear, smooth boundary. 3 to 8 inches thick.

B_1 7 to 14 inches, light yellowish-brown (10YR 6/4) fine sandy clay loam; common, fine, faint mottles of light gray (10YR 7/2); weak, medium, platy structure; friable; extremely acid; clear, smooth boundary. 4 to 8 inches thick.

B_{3m1} 14 to 19 inches, mottled light yellowish-brown (2.5Y 6/4) and light-gray (2.5Y 7/2) fine sandy clay loam; mottles are common, fine, and faint; massive to weak, medium, blocky structure; brittle, compact in place; extremely acid; clear, smooth boundary. 4 to 9 inches thick.

B_{3m2} 19 to 31 inches, light olive-gray (5Y 6/2) fine sandy loam; many, fine, faint mottles of light gray (5Y 7/2); massive; friable, compact in place; few, small, soft, brown concretions; extremely acid; abrupt, irregular boundary. 10 to 18 inches thick.

B_{3m3} 31 to 39 inches, light yellowish-brown (2.5Y 6/4) fine sandy clay loam; a few, fine and medium, faint mottles of light brownish gray (2.5Y 6/2); weak, coarse, blocky structure to massive; friable, very compact in place; common, medium-sized, soft, brown concretions; extremely acid; clear, smooth boundary. 6 to 11 inches thick.

C 39 to 60 inches, brownish-yellow (10YR 6/8), stratified beds of sandy and clayey materials with a few, medium, distinct mottles of light brownish gray (10YR 6/2); extremely acid.

The thickness of the alluvial material ranges from 4 feet to more than 10 feet. Depth to the fragipan ranges from about 13 to 20 inches.

This soil is moderately wet; water stands in the depressions after heavy rains, and tile drainage is generally not feasible. The root zone is shallow over the fragipan, and the moisture-supplying capacity is moderately high. Natural fertility is low, but the supply of plant nutrients is fairly easy to build up. Permeability is moderate above the fragipan. The content of organic matter is low. The soil is easy to till. (Capability unit IIIw-1; woodland suitability group 9.)

Tyler silt loam (0 to 2 percent slopes) (Ty).—This is a somewhat poorly drained soil of stream terraces. The soil has a fragipan. It developed in alluvium derived from siltstone, sandstone, and shale. The following describes a profile in a moist field along Highway No. 211, 1.6 miles southwest of Salt Lick:

A_{00} 1 inch to 0, partly decomposed leaves from hardwoods and litter from pines.

A_1 0 to 3 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine and medium, crumb structure; very friable; very strongly acid; abrupt, smooth boundary. 2 to 5 inches thick.

A_2 3 to 10 inches, brown (10YR 5/3) silt loam; a few, fine, faint mottles of very pale brown (10YR 7/4); weak, fine, granular structure; friable; very strongly acid; abrupt, smooth boundary. 4 to 8 inches thick.

B_2 10 to 16 inches, light yellowish-brown (10YR 6/4) silt loam; common, fine, faint mottles of light gray (10YR 6/1); weak to moderate, medium, subangular blocky structure; patchy clay films on the surfaces of peds and in pores; friable; extremely acid; clear, smooth boundary. 4 to 8 inches thick.

B_{3m1} 16 to 25 inches, mottled olive (5Y 5/3), strong-brown (7.5YR 5/8), and light-gray (N 7/1) silt loam; mottles are many, fine and medium, and distinct; massive to weak, medium, blocky structure; friable, compact in place; extremely acid; gradual, smooth boundary. 7 to 15 inches thick.

B_{3m2} 25 to 36 inches, mottled light brownish-gray (10YR 6/2), strong-brown (7.5YR 5/6), and olive (5Y 5/3) silt loam; mottles are many, medium, and distinct; massive to weak, coarse, blocky structure; friable, compact in place; extremely acid; gradual, smooth boundary. 9 to 25 inches thick.

C 36 to 48 inches +, pale-olive (5Y 6/3) silty clay loam; common, fine, faint mottles of pale yellow (5Y 7/3); massive; friable to firm, compact in place; slightly plastic; extremely acid.

In places the A_2 horizon is dominantly light yellowish brown (10YR 6/4), the B_2 horizon is brownish yellow (10YR 6/6), and the fragipan is light yellowish brown (2.5Y 6/4). The thickness of the alluvial material ranges from 4 to more than 10 feet. Depth to the fragipan ranges from 14 to about 20 inches.

Mapped with this soil is a small acreage in which the parent material was colluvium rather than general stream alluvium. In these areas the color of the surface layer is brown (10YR 5/3 to 4/3).

Tyler silt loam is moderately wet; water stands in the depressions after heavy rains, and tile drainage is generally not feasible. The root zone is shallow over the fragipan, and the moisture-supplying capacity is moderately high. Naturally fertility is moderately low, but the supply of plant nutrients is fairly easy to build up. Permeability is moderate above the fragipan; the content of organic matter is low. The soil is easy to till. (Capability unit IIIw-1; woodland suitability group 9.)

Whitwell Series

The Whitwell series consists of deep, moderately well drained to somewhat poorly drained soils of low stream terraces or second bottoms. The soils have a surface layer of dark grayish-brown silt loam that overlies a subsoil of yellowish-brown silty clay loam. Below the subsoil is mottled light olive-brown silty clay. General alluvium is the material in which the soils formed. The alluvium washed from soils that developed in material weathered from acid sandstone, shale, and siltstone. The soils are naturally acid. They are in nearly level areas or in slight depressions. In some places they are covered by slack water.

These soils are associated with the Sequatchie and Atkins soils. Although the Whitwell soils are subject to infrequent flooding, they are in higher areas and are better drained than the Atkins soils. The Whitwell soils are less well drained and are in slightly lower positions than the Sequatchie soils.

All of the acreage of Whitwell soils has been cleared. It is used to grow row crops and hay.

Whitwell silt loam (0 to 2 percent slopes) (Wh).—This is the only Whitwell soil mapped in the county. It occurs in rather large areas on low stream terraces along the river bottoms near Salt Lick. The soil is moderately well drained to somewhat excessively drained; it developed in alluvium derived mainly from acid shale but contains some material from sandstone and siltstone. The following describes a profile in a moist field along Highway No. 211, 0.5 of a mile north of U.S. Highway No. 60:

A_p 0 to 9 inches, dark grayish-brown (10YR 4/2) fine silt loam; moderate, fine and medium, granular structure; firm, slightly sticky and slightly plastic; very strongly acid; clear, smooth boundary. 6 to 10 inches thick.

B_1 9 to 16 inches, yellowish-brown (10YR 5/4) fine silty clay loam; surfaces of peds coated dark grayish brown (10YR 4/2); strong, medium and coarse, subangular blocky structure; firm, slightly sticky and slightly plastic; extremely acid; gradual, smooth boundary. 6 to 9 inches thick.

B_2 16 to 44 inches, light olive-brown (2.5Y 5/6) silty clay loam; common, fine, faint mottles of light brownish gray (2.5Y 6/2) and yellowish brown (10YR 5/4) and a few, fine, distinct mottles of strong brown (7.5YR 5/8); strong, medium and coarse, blocky structure; thin, continuous clay films on the surfaces of peds; very firm, sticky and plastic; extremely acid; gradual, smooth boundary. 24 to 36 inches thick.

C 44 to 50 inches, light yellowish-brown (2.5Y 6/4) silty clay; common, fine, distinct mottles of dark brown (7.5YR 4/4) and gray (5Y 6/1) and a few, fine, distinct, black (10YR 2/1) stains; moderate, medium and coarse, blocky structure; very firm, sticky and plastic; extremely acid.

The A_p horizon ranges from dark grayish brown (10YR 4/2) to grayish brown (10YR 5/2) or brown (10YR 4/3). In a few areas the texture of the B_2 horizon is silty clay.

Mapped with this soil is a small acreage in which the texture of the surface layer is loam.

Whitwell silt loam is slightly to moderately wet, but the drainage can be improved by tile. The root zone is deep, and the moisture-supplying capacity is very high. Natural fertility is moderate, but the supply of plant nutrients is fairly easy to build up and the soil is easy to till. Permeability is moderate. The content of organic matter is medium. (Capability unit IIw-4.)

Woolper Series

The Woolper series consists of deep, fine-textured, well drained to moderately well drained soils on toe slopes or alluvial fans. In areas that are not eroded, the surface layer is very dark grayish-brown silty clay loam. The subsoil is dark-brown silty clay loam that grades to silty clay or clay at a depth of about 12 inches. The soils formed in fine-textured local alluvium washed from the Otway and Fairmount soils. They are nearly level to strongly sloping.

These soils are on toe slopes above the Sees soils and are better drained than those soils. In places they are on toe slopes with the Ashton soils, but they are darker colored, finer textured, and more alkaline than the Ashton soils. The Woolper soils are in positions below those occupied by the Otway and Fairmount soils. They are much deeper and have a better developed profile than those soils.

The Woolper soils are in limestone valleys north of Owingsville. Nearly all of the acreage has been cleared and is used to grow row crops and hay.

Woolper silty clay loam, 2 to 6 percent slopes (WoB).—This well drained to moderately well drained, fine-textured soil is on toe slopes. The alluvium in which it formed washed from soils developed in material weathered from limestone. The following describes a profile in a moist field along Oakley Road, 0.1 of a mile west of Pebble:

A_p 0 to 6 inches, very dark grayish-brown (10YR 3/2 and 2.5Y 3/2) silty clay loam; moderate to strong, fine, granular structure; friable; slightly sticky and slightly plastic; mildly alkaline; clear, smooth boundary. 4 to 7 inches thick.

B_1 6 to 12 inches, dark-brown (10YR 3/3) fine silty clay loam; moderate, fine and medium, blocky structure; weak clay films are common; firm, slightly sticky and slightly plastic; mildly alkaline; gradual, smooth boundary. 5 to 7 inches thick.

B_2 12 to 20 inches, dark-brown (10YR 4/3) silty clay or clay; strong, medium, blocky structure; noticeable clay films on the surfaces of peds; very firm, sticky and slightly plastic; mildly alkaline; clear, smooth boundary. 7 to 9 inches thick.

B_3 20 to 42 inches, dark yellowish-brown (10YR 4/4) silty clay; common, fine, faint mottles of light yellowish brown (2.5Y 6/4) and dark brown (10YR 3/3); strong, medium, blocky structure; noticeable clay films on the surfaces of peds; very firm, sticky and plastic; few, very fine, dark concretions; mildly alkaline; gradual, wavy boundary. 18 to 24 inches thick.

C_1 42 to 46 inches, brown (10YR 4/3) clay; mottles of dark yellowish brown (10YR 4/4) and light yellowish brown (2.5Y 6/4); moderate, coarse, blocky structure; very firm, sticky and plastic; mildly alkaline; gradual, wavy boundary. 3 to 7 inches thick.

C_2 46 inches +, light yellowish-brown (2.5Y 6/4) clay; many, fine, distinct mottles of dark brown; weak, coarse, blocky structure to massive; very firm, sticky and plastic; moderately alkaline.

The A_p horizon ranges from dark brown (10YR 4/3 to 3/3) to very dark grayish brown (10YR 3/2). In the well-drained areas the B horizons are dark brown (10YR 3/3 to 3/4) or dark yellowish brown (10YR 4/4). The moderately well drained areas are dark yellowish brown (10YR 4/4), yellowish brown (10YR 5/6), or strong brown (7.5YR 5/6) and are mottled below a depth of about 14 to 20 inches. In many places the C horizons are olive (5Y 5/3). Depth to bedrock ranges from about 36 inches to more than 6 feet.

Mapped with this soil are a few small areas that are gravelly, cherty, or flaggy. Also included are a few small areas of an Egam silty clay loam formed in local alluvium.

For Woolper silty clay loam, 2 to 6 percent slopes, the hazard of erosion is moderately low. The root zone is deep, and the moisture-supplying capacity is very high. The soil is high in natural fertility, but it is somewhat difficult to till because of the moderately fine texture of the plow layer. Permeability is moderately slow. The content of organic matter is medium to high. (Capability unit IIe-4.)

Woolper silty clay loam, 6 to 12 percent slopes (WoC).—This is a well-drained, fine-textured soil on toe slopes. The alluvium in which it formed was washed from soils that developed in material weathered from limestone. The profile is similar to the profile of Woolper silty clay loam, 2 to 6 percent slopes.

Mapped with this soil are a few small areas that are gravelly, cherty, or flaggy. Also included are small, moderately eroded areas in which the A horizon is thinner than that in the normal soil and is brown to dark brown.

For Woolper silty clay loam, 6 to 12 percent slopes, the hazard of erosion is moderate. The root zone is deep, and the moisture-supplying capacity is high. The soil is high in natural fertility, but it is somewhat difficult to till because of the moderately fine texture of the plow layer. Permeability is moderately slow. The content of organic matter is medium to high. (Capability unit IIIe-4.)

Woolper silty clay loam, 12 to 20 percent slopes, eroded (WoD2).—This soil is well drained and fine textured. It is on toe slopes, where it formed in alluvium. The profile of this soil is similar to that of Woolper silty clay loam, 2 to 6 percent slopes, but the A horizon is somewhat thinner and is brown or dark brown.

Mapped with this soil is a small acreage in which the soil is not eroded and is similar to Woolper silty clay loam, 2 to 6 percent slopes. Also included are small areas of a soil that is gravelly, cherty, or flaggy.

For Woolper silty clay loam, 12 to 20 percent slopes, eroded, the hazard of further erosion is high. The root zone is deep, and the moisture-supplying capacity is moderately high. The soil is high in natural fertility. It is somewhat difficult to till, however, because of the moderately fine texture of the plow layer, and the strong slopes make the use of farm machinery difficult. Permeability is moderately slow. The content of organic matter is medium. (Capability unit IVe-3.)

Use and Management of the Soils

This section has four main parts. In the first, the system of capability classification used by the Soil Conservation Service is explained, the capability units of Bath County are briefly defined, and management practices are suggested for the soils of each capability unit. In the second, estimated average acre yields for each soil are given for commonly grown crops; the yields indicated are those that can be obtained under a high level of management and are yields that it was considered practical to reach. In the third part, management of woodlands and yields of wood products are discussed, and, in the fourth, soil qualities that affect engineering.

Capability Groups of Soils

The capability classification is a grouping of soils that shows, in a general way, how suitable they are for most kinds of farming. It is a practical grouping based on limitations of the soils, the risk of damage when they are used, and the way they respond to treatment.

In this system all the kinds of soil are grouped at three levels, the capability class, subclass, and unit. The eight capability classes in the broadest grouping are designated by Roman numerals I through VIII. In class I are the soils that have few limitations, the widest range of use, and the least risk of damage when they are used. The soils in the other classes have progressively greater natural limitations. In class VIII are soils and landforms so rough, shallow, or otherwise limited that they do not produce worthwhile yields of crops, forage, or wood products.

The subclasses indicate major kinds of limitations within the classes. Within most of the classes there can be as many as four subclasses. The subclass is indicated by adding a small letter, *e*, *w*, *s*, *or c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* means that water in or on the soil will interfere with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the country, indicates that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few or no limitations. Class V can contain, at the most, only subclasses *w*, *s*, and *c*, because the soils in it have little or no susceptibility to erosion but have other limitations that limit their use largely to pasture, range, woodland, or wildlife.

Within the subclasses are the capability units, groups of soils enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping of soils for making many statements about their management. Capability units are generally identified by numbers assigned locally, for example, IIe-1 or IIIe-2.

Soils are classified in capability classes, subclasses, and units in accordance with the degree and kind of their permanent limitations; but without consideration of major and generally expensive landforming that would change the slope, depth, or other characteristics of the soil; and without consideration of possible but unlikely major reclamation projects.

The eight classes in the capability system, and the subclasses and units in this county, are described in the list that follows.

Class I.—Soils that have few limitations that restrict their use.
- No subclasses.
  - Unit I-1.—Deep, well-drained soils on flood plains.
  - Unit I-2.—Deep, moderately well drained soils on flood plains.
  - Unit I-3.—Deep, well-drained, nearly level soil on uplands.

Class II.—Soils that have some limitations that reduce the choice of plants or that require moderate conservation practices.
- Subclass IIe.—Soils subject to moderate erosion if they are not protected.
  - Unit IIe-1.—Deep, well-drained, gently sloping, fertile soils on uplands and terraces.
  - Unit IIe-2.—Deep, well-drained, gently sloping fertile soils on uplands.
  - Unit IIe-4.—Deep, well-drained, gently sloping soils that have a moderately fine textured surface layer and are moderately fertile.
  - Unit IIe-6. Slightly wet, gently sloping, moderately fertile soils that are underlain by a dense or brittle layer.

Unit IIe-7.—Slightly wet, gently sloping soils that are underlain by a dense or brittle layer and are moderately low in fertility.

Unit IIe-9.—Well drained, gently sloping, moderately fertile soil.

Unit IIe-10.—Well drained to moderately well drained, gently sloping, moderately fertile soils on uplands.

Subclass IIw.—Soils that have moderate limitations because of excess water.

Unit IIw-1.—Slightly wet, nearly level, moderately fertile soils that are underlain by a dense or brittle layer.

Unit IIw-2.—Slightly wet, nearly level soil that is underlain by a dense or brittle layer and is moderately low in fertility.

Unit IIw-3.—Deep, slightly wet, gently sloping, moderately fine textured soil on foot slopes.

Unit IIw-4.—Deep, somewhat poorly drained soils on flood plains.

Subclass IIs.—Soils that have moderate limitations of moisture capacity or tilth.

Unit IIs-1.—Deep, well-drained, slightly droughty, gravelly soils on flood plains.

Unit IIs-3.—Deep, moderately fine textured, nearly level soils on flood plains or low terraces.

Class III.—Soils that have severe limitations that reduce the choice of plants, or that require intense conservation practices or both.

Subclass IIIe.—Soils subject to severe erosion if they are cultivated and not protected.

Unit IIIe-1.—Deep, well-drained, sloping, fertile soils that have a friable subsoil.

Unit IIIe-2.—Deep, well-drained, sloping, fertile soils that have a firm subsoil.

Unit IIIe-4.—Deep, well-drained, sloping, fertile soils that have a moderately fine textured surface layer.

Unit IIIe-5.—Deep, well-drained, sloping, moderately fertile, gravelly or cherty soils.

Unit IIIe-7.—Well-drained, sloping, moderately fertile soil.

Unit IIIe-8.—Slightly wet, sloping, moderately fertile soils.

Unit IIIe-9.—Slightly wet, sloping soils that are underlain by a dense or brittle layer.

Unit IIIe-10.—Moderately deep, well-drained, eroded, sloping soil that has a moderately fine textured surface layer.

Unit IIIe-14.—Moderately deep, well drained to moderately well drained, gently sloping soil of moderately low fertility.

Unit IIIe-15.—Slightly wet, cherty soils that are underlain by a dense or brittle layer.

Subclass IIIw.—Soils that have severe limitations because of excess water.

Unit IIIw-1.—Somewhat poorly drained, nearly level soils that are underlain by a dense or brittle pan or by a claypan.

Unit IIIw-2.—Very poorly drained, nearly level, dark-colored soil, high in organic matter.

Unit IIIw-3.—Somewhat poorly drained, gently sloping soils that are underlain by a dense or brittle pan or a claypan.

Unit IIIw-5.—Deep, poorly drained soils on flood plains.

Unit IIIw-7.—Very poorly drained, nearly neutral, dark-colored soil on flood plains; high in organic matter and has a moderately fine textured surface layer.

Class IV.—Soils that have very severe limitations that restrict the choice of plants, or that require very careful management, or both.

Subclass IVe.—Soils subject to very severe erosion if they are cultivated and not protected.

Unit IVe-1.—Deep, well-drained, strongly sloping, fertile soils that have a friable subsoil.

Unit IVe-2.—Well-drained, slightly droughty, strongly sloping soils.

Unit IVe-3.—Deep, well-drained, strongly sloping, moderately fertile soils that have a firm subsoil.

Unit IVe-4.—Strongly sloping, moderately fertile, eroded soil.

Unit IVe-6.—Sloping, slightly droughty soils that have a moderately fine textured or fine textured surface layer.

Unit IVe-8.—Sloping, droughty soils formed in material weathered from acid clay shale.

Unit IVe-11.—Sloping, severely eroded soil that has a moderately fine textured surface layer.

Subclass IVw.—Soils that have very severe limitations for cultivation because of excess water.

Unit IVw-1.—Poorly drained, nearly level soils that are underlain by a dense or brittle layer.

Class V.—Soils not likely to erode but that have other limitations, impractical to remove without major reclamation, that limit their use largely to pasture, woodland, or wildlife food and cover.

Subclass Vs.—Soils generally unsuitable for cultivation, because of moisture capacity or tilth.

Unit Vs-1.—Moderately deep, stony soils on flood plains.

Class VI.—Soils that have severe limitations that make them generally unsuitable for cultivation and that limit their use largely to pasture, woodland, or wildlife food and cover.

Subclass VIe.—Soils severely limited, chiefly by risk of erosion if protective cover is not maintained.

Unit VIe-1.—Sloping to moderately steep soils that have a moderately fine textured surface layer.

Unit VIe-2.—Moderately deep, strongly sloping, severely eroded soils that have a fine textured or moderately fine textured surface layer.

Unit VIe-4.—Sloping and strongly sloping, severely eroded soils that have a fine-textured surface layer.

Unit VIe-8.—Sloping and strongly sloping soils of low fertility and developed in material weathered from clay shale.

Subclass VIs.—Soils generally unsuitable for cultivation and limited for other uses by their moisture capacity, stones, or other features.

Unit VIs-1.—Very rocky, sloping and strongly sloping, eroded soils.

Unit VIs-3.—Sloping and strongly sloping, stony, shaly, or cherty soils.

Class VII.—Soils that have very severe limitations that make them unsuitable for cultivation, and that restrict their use largely to grazing, woodland, or wildlife food and cover.

Subclass VIIe.—Soils very severely limited, chiefly by risk of erosion if protective cover is not maintained.

Unit VIIe–1.—Shallow to moderately deep, steep and moderately steep, droughty soils that have a moderately fine textured surface layer.

Unit VIIe–2.—Shallow, moderately steep and steep soils.

Unit VIIe–4—Land essentially destroyed by gullying.

Subclass VIIs.—Soils very severely limited by moisture capacity, stones, or other soil features.

Unit VIIs–1.—Shallow and moderately deep, moderately steep and steep, shaly or stony soils.

Unit VIIs–2.—Moderately steep, very rocky, eroded soils.

Unit VIIs–3.—Very shallow, sloping to very steep, very droughty soils.

Unit VIIs–5.—Land that has 25 to 90 percent of the surface covered by rocks.

Class VIII.—Soils and landforms that have limitations that preclude their use, without major reclamation, for commercial production of plants; and that restrict their use to recreation, wildlife, water supply, or esthetic purposes. (None in Bath County.)

Management by capability units

The soils in a given capability unit have about the same limitations and susceptibility to damage, need about the same kind of management, and respond to management in about the same way. In the following pages each capability unit is described, the soils in it are named, and management for the group is suggested.

CAPABILITY UNIT I–1

This unit consists of deep, well-drained soils on flood plains. The soils have no more than slight limitations to use, and, for crops grown on them, the yield potential is high. The following soils are in this unit:

Huntington silt loam.
Pope silt loam.
Pope fine sandy loam.

These soils are suitable for intensive cropping and can be used to grow many different kinds of crops. They are flooded occasionally early in spring, which makes the growing of winter grain hazardous. Sometimes streams within the areas need to have their channels improved.

CAPABILITY UNIT I–2

This unit consists of deep, moderately well drained soils on flood plains. The soils have only slight limitations to use. For crops grown on them, the yield potential is high. The following soils are in this unit:

Lindside silt loam.
Philo silt loam.

These soils can be drained to increase yields. Diversions or levees may be required to keep water from higher lying areas from flowing onto them. After they are drained, the soils can be used the same as the soils in capability unit I–1.

CAPABILITY UNIT I–3

Only Hagerstown silt loam, 0 to 2 percent slopes, is in this capability unit. This deep, well-drained, nearly level soil is on uplands. It has no more than slight limitations to use, and, for crops grown on it, the yield potential is high.

The soil is suited to all of the crops commonly grown in the county. If well managed, it can be used year after year for cultivated crops.

CAPABILITY UNIT IIe–1

Deep, well-drained, gently sloping, fertile soils on uplands and terraces make up this capability unit. For crops grown on the soils, the yield potential is high. The hazard of erosion is moderately low. The following soils are in this unit:

Allegheny loam, 2 to 6 percent slopes.
Ashton silt loam, 2 to 6 percent slopes.
Elk silt loam, 2 to 6 percent slopes.
Hagerstown silt loam, 2 to 6 percent slopes.
Shelbyville silt loam, 2 to 6 percent slopes.

The soils of this unit are suited to all the crops commonly grown in the county. They need a good cropping system and good management that will help to control erosion.

CAPABILITY UNIT IIe–2

This unit consists of deep, well-drained, gently sloping, fertile soils of uplands. For these soils, the hazard of erosion is moderately low. The crops grown have a moderately high yield potential. The following soils are in this unit:

Beasley silt loam, 2 to 6 percent slopes.
Lowell silt loam, 2 to 6 percent slopes.
Lowell silt loam, 2 to 6 percent slopes, eroded.

These soils require more protection from erosion than the soils of capability unit IIe–1. Otherwise, the soils of the two units can be managed the same.

CAPABILITY UNIT IIe–4

This unit consists of deep, well-drained, gently sloping soils that have a moderately fine textured surface layer. The soils are moderately fertile, but they are rather hard to work. In areas that are eroded, the content of organic matter is low, but it is somewhat higher in areas that are not eroded. For crops grown on these soils, the yield potential is moderate. The following soils are in this unit:

Beasley silty clay loam, 2 to 6 percent slopes, eroded.
Woolper silty clay loam, 2 to 6 percent slopes.

The soils of this capability unit are suited to all the crops commonly grown in the county. They require a cropping system and management practices that will help to control erosion. The soils should be worked when they are neither too wet nor too dry.

CAPABILITY UNIT IIe–6

Slightly wet, gently sloping soils that are moderately fertile make up this unit. The soils are underlain by a dense or brittle layer, and they are slightly droughty. Their root zone extends to a depth of 18 to 28 inches. In the included eroded areas, the content of organic matter is low, but it is higher in the uneroded areas. The hazard of erosion is moderately low. For crops grown on these

soils, the yield potential is moderate. The following soils are in this unit:

Bedford silt loam, 2 to 6 percent slopes.
Captina silt loam, 2 to 6 percent slopes.

These soils are well suited to most of the crops commonly grown in the county, but they are not well suited to alfalfa and other deep-rooted plants. If a deep-rooted crop is planted, the stand does not last long. Many different cropping systems can be used on these soils, and a number of different practices can be used to help control erosion.

CAPABILITY UNIT IIe-7

In this unit are slightly wet, gently sloping soils that are moderately low in fertility. The soils are underlain by a dense or brittle layer, and they are slightly droughty. Their root zone extends to a depth of 15 to 24 inches. In the included eroded areas, the content of organic matter is low, but it is slightly higher in uneroded areas. The yield potential is moderate to moderately low. The following soils are in this unit:

Monongahela silt loam, 2 to 6 percent slopes.
Monongahela fine sandy loam, 2 to 6 percent slopes.
Tilsit silt loam, 2 to 6 percent slopes.

These soils are managed about the same as the soils in capability unit IIe-6. Crops grown on them make lower yields, however, than crops grown on the soils of capability unit IIe-6.

CAPABILITY UNIT IIe-9

Only one soil, Trappist silt loam, 2 to 6 percent slopes, is in this capability unit. This gently sloping soil is well drained and moderately fertile. The yield potential is moderate, although the soil is slightly droughty and is low in organic matter. In the included eroded areas, the root zone extends to a depth of 20 to 30 inches, but it extends to a greater depth in uneroded areas. The hazard of erosion is moderately low.

If this soil is well managed, it is suited to all of the crops commonly grown in the county. A good cropping system and good management practices are needed to help control erosion.

CAPABILITY UNIT IIe-10

Well drained to moderately well drained, gently sloping soils of uplands make up this capability unit. The soils are moderately fertile, and the yield potential is moderately high. The content of organic matter is low. In the included eroded areas, the root zone extends to a depth of 20 to 30 inches, but it extends to a slightly greater depth in uneroded areas. The hazard of erosion is moderately low. The following soils are in this unit:

Cruze silt loam, 2 to 8 percent slopes.
Nicholson silt loam, 0 to 6 percent slopes.

These soils are managed about the same as those in capability unit IIe-9. Under the same management, however, yields are higher than yields obtained on the soils of capability unit IIe-9.

CAPABILITY UNIT IIw-1

Slightly wet, nearly level soils that are underlain by a dense or brittle layer make up this capability unit. The root zone of these soils extends to a depth of 20 to 30 inches. The soils are slightly droughty, but they are moderately fertile, and the yield potential is moderately high. The following soils are in this unit:

Bedford silt loam, 0 to 2 percent slopes.
Captina silt loam, 0 to 2 percent slopes.

Drainage of these soils is impeded by the tight, compact layer in the lower part of the subsoil. Because of this layer, the soil remains wet until late in spring and preparation of the seedbed is delayed. In addition, the growth of plants is retarded during periods of heavy rainfall, and the compact layer limits the depth to which roots can penetrate.

These soils are not well suited to deep-rooted plants. A stand of deep-rooted plants does not last longer than 2 years. The soils are suited to all of the other crops commonly grown in the county. If they are well managed, they can be used intensively for cultivated crops.

CAPABILITY UNIT IIw-2

Only one soil, Monongahela silt loam, 0 to 2 percent slopes, is in this capability unit. This soil is nearly level and is slightly wet. It is underlain by a dense or brittle layer and is moderately low in fertility. The root zone of this soil extends to a depth of 20 to 28 inches. The soil is slightly droughty, and the yield potential is only moderate.

This soil is managed about the same as the soils of capability unit IIw-1. Under the same management, however, yields are lower.

CAPABILITY UNIT IIw-3

Only one soil, Sees silty clay loam, 2 to 6 percent slopes, is in this capability unit. This deep, slightly wet, moderately fine textured soil is gently sloping and is on foot slopes. The content of organic matter is medium to high in most areas. The hazard of erosion is moderately low for this soil, but, because of the moderately fine texture of the plow layer, the soil is rather hard to work. The yield potential is moderate.

This soil receives seepage water from the adjacent uplands, and water drains slowly through the profile. The drainage ranges from somewhat poor to moderately good. Without drainage, the soil is suited to hay and pasture, but, if it is drained, it is suited to all the crops commonly grown in the county. In addition to drainage the soil needs a carefully chosen cropping system and management practices that will help control erosion.

CAPABILITY UNIT IIw-4

This capability unit consists of deep, somewhat poorly drained soils on flood plains. The soils are slightly wet in places, even after they are drained. Nevertheless, the yield potential is moderately high. The following soils are in this unit:

Newark silt loam.
Stendal silt loam.
Whitwell silt loam.

These soils are at a lower elevation than the better drained soils in the county, and they are subject to a little more overflow. For good yields, they need to be drained; diversions and levees may be needed to keep them from receiving water from adjoining areas. The soils are suited to all the crops commonly grown in the county, but tobacco is usually grown only in areas where there is no danger of flooding.

CAPABILITY UNIT IIs-1

Deep, well-drained, slightly droughty, gravelly soils on flood plains make up this capability unit. Because of the gravel, the soils are rather hard to work. Crops grown on them have a moderate yield potential. The following soils are in this unit:

Huntington gravelly silt loam.
Pope gravelly silt loam.

These soils are suited to all the crops commonly grown in the county.

CAPABILITY UNIT IIs-3

This capability unit consists of deep, moderately fine textured, nearly level soils on flood plains or low terraces. Their moderately fine texture makes these soils rather hard to work, but the yield potential is high. The following soils are in this unit:

Egam silty clay loam.
Sequatchie silty clay loam, heavy variant, 0 to 4 percent slopes.

These soils are suited to all the crops commonly grown in the county. They can be cropped intensively if a high level of management is used.

CAPABILITY UNIT IIIe-1

This capability unit is made up of deep, well-drained, sloping, fertile soils that have a friable subsoil. The following soils are in this unit:

Allegheny loam, 6 to 12 percent slopes.
Allegheny loam, 6 to 12 percent slopes, eroded.
Ashton silt loam, 6 to 12 percent slopes.
Elk silt loam, 6 to 12 percent slopes, eroded.
Hagerstown silt loam, 6 to 12 percent slopes, eroded.
Shelbyville silt loam, 6 to 12 percent slopes.
Shelbyville silt loam, 6 to 12 percent slopes, eroded.

These soils are suited to all the crops commonly grown in the county. The cropping system needs to be chosen more carefully, however, than for the soils of capability unit IIe-1, and more careful management is needed to protect them from erosion. In most places the short slopes need to be cultivated on the contour. Terracing or stripcropping is required in most places on the longer slopes.

CAPABILITY UNIT IIIe-2

Deep, well-drained, sloping, fertile soils that have a firm subsoil make up this capability unit. Some of the soils are eroded, and there is a moderate hazard of further erosion. Nevertheless, the yield potential is moderately high. The following soils are in this unit:

Fleming silt loam, 6 to 12 percent slopes, eroded.
Lowell silt loam, 6 to 12 percent slopes.
Lowell silt loam, 6 to 12 percent slopes, eroded.
Muse silt loam, 6 to 12 percent slopes.
Muse silty clay loam, 6 to 12 percent slopes, eroded.

These soils are suited to all the crops commonly grown in the county. Muse silty clay loam, 6 to 12 percent slopes, eroded, is somewhat difficult to work, however, because of the moderately fine texture of the plow layer. During severe winters, heaving may damage stands of fall-seeded legumes grown on that soil.

The soils of this unit need more protection from erosion than the soils of capability unit IIIe-1. The cropping system also needs to be chosen more carefully. In most places contouring is necessary on the shorter slopes, and terracing or stripcropping, on the longer slopes.

CAPABILITY UNIT IIIe-4

This unit is made up of deep, well-drained, sloping, fertile soils that have a moderately fine textured surface layer. In eroded areas the soils are low in organic matter. They are somewhat difficult to work because of the moderately fine texture of the plow layer, but the yield potential is moderate. The following soils are in this unit:

Beasley silty clay loam, 6 to 12 percent slopes, eroded.
Woolper silty clay loam, 6 to 12 percent slopes.

These soils are suited to all the crops commonly grown in the county, but a good stand of grass is difficult to obtain. They can be used and managed about the same as the soils of capability unit IIIe-1, but practices to control erosion, and other management practices, must be applied more intensively. The cropping system must also be chosen more carefully.

CAPABILITY UNIT IIIe-5

Deep, well-drained, sloping soils that are moderately fertile and that are gravelly or cherty make up this capability unit. Some areas of these soils are already eroded, and there is a moderate hazard of further erosion. Because of the chert and gravel, the soils are somewhat difficult to work. The yield potential is moderate. The following soils are in this unit:

Hagerstown cherty silt loam, 6 to 12 percent slopes, eroded.
Jefferson gravelly silt loam, 2 to 12 percent slopes.

These soils are suited to all the crops commonly grown in the county. They need practices of erosion control similar to those suggested for the soils of capability unit IIIe-1. The practices include contouring on short slopes and using terraces or stripcropping on the longer slopes.

CAPABILITY UNIT IIIe-7

Only one soil, Trappist silt loam, 6 to 12 percent slopes, eroded, is in this capability unit. This well-drained, sloping soil has a root zone that extends to a depth of 20 to 33 inches. The soil is moderately fertile, but there is a moderate hazard of further erosion. The content of organic matter is low, and the soil is slightly droughty in the shallower areas. The yield potential is moderate.

This soil is suited to all the crops commonly grown in the county. Yields are only moderate, however, and stands of bluegrass, bromegrass, alfalfa, and similar plants do not last more than 1 or 2 years. At least 2 years of meadow or pasture ought to be included in the cropping system. Contour cultivation, terraces, or stripcropping are needed in most areas.

CAPABILITY UNIT IIIe-8

Slightly wet, sloping, moderately fertile soils make up this capability unit. The root zone of these soils extends to a depth of 15 to 30 inches. There is a moderate hazard of erosion, and, in areas that are already eroded, the content of organic matter is low. The soils are slightly droughty, and the yield potential is moderate. The following soils are in this unit:

Captina silt loam, 6 to 12 percent slopes, eroded.
Sees silty clay loam, 6 to 12 percent slopes.

If a high level of management is used, these soils are suited to all the crops commonly grown in the county. They will need to be managed more carefully than the other soils of class III, as they are more susceptible to

erosion. The cropping system must also be chosen more carefully.

CAPABILITY UNIT IIIe-9

This unit is made up of slightly wet, sloping soils that are underlain by a dense or brittle layer. The root zone extends to a depth of only 15 to 24 inches, and there is a moderate hazard of erosion. The soils are moderately fertile, but they are slightly to moderately droughty. In eroded areas the soils are low in content of organic matter. The yield potential is moderately low. The following soils are in this unit:

Monongahela fine sandy loam, 6 to 12 percent slopes.
Monongahela fine sandy loam, 6 to 12 percent slopes, eroded.
Monongahela silt loam, 6 to 12 percent slopes.
Monongahela silt loam, 6 to 12 percent slopes, eroded.
Tillsit silt loam, 6 to 12 percent slopes.

These soils are suited to all the crops commonly grown in the county, but yields are moderately low. Careful management is needed to control erosion.

CAPABILITY UNIT IIIe-10

Only one soil, Lowell silty clay loam, shallow, 2 to 6 percent slopes, eroded, makes up this capability unit. This moderately deep, well-drained, sloping soil is eroded, and there is a moderate hazard of further erosion. The soil has a moderately fine textured surface layer and a root zone that extends to a depth of 20 to 30 inches. It is slightly droughty and is low in organic matter. The yield potential is moderate.

This soil is suited to most of the crops commonly grown in the county, but it is not well suited to bromegrass, redtop, reed canarygrass, alfalfa, birdsfoot trefoil, alsike clover, red clover, Kobe lespedeza, and similar crops. The cropping system must be chosen carefully. Practices that will keep erosion to a minimum are needed if cultivated crops are to be grown.

CAPABILITY UNIT IIIe-14

Only one soil, Rarden silt loam, 2 to 6 percent slopes, is in this capability unit. This well drained to moderately well drained, gently sloping soil is moderately low in fertility. Its root zone extends to a depth of 20 to 30 inches. The soil is slightly to moderately droughty, and there is a moderate hazard of erosion. In the included areas that are eroded, the content of organic matter is low. This soil is somewhat hard to work because of the moderately fine texture of its plow layer. The yield potential is moderately low.

This soil is only fairly well suited to the crops commonly grown in the county, and close-growing crops should be grown a large part of the time. Yields are never likely to be high because the cost of producing such yields would be too great to be justified.

CAPABILITY UNIT IIIe-15

Only one soil, Landisburg cherty silt loam, 2 to 12 percent slopes, is in this capability unit. This soil is cherty and slightly wet. It is underlain by a dense or brittle layer and has a root zone that extends to a depth of 18 to 25 inches. The soil is moderately droughty, and the hazard of erosion is moderately high. It is moderate in fertility, but it is somewhat difficult to work because of the content of chert. The yield potential is moderately low.

The kinds of pasture and meadow plants to which this soil is suited are somewhat restricted, but fescue, redtop, alsike clover, and Korean, sericea, or Kobe lespedezas grow better than other crops. If cultivated crops are grown, a high level of management must be used. The cropping system will need to be chosen carefully, and practices to control erosion should be applied intensively. The small, strongly sloping areas of this soil require more careful management than is generally needed for the soils of class III, and the choice of plants that will grow on them is more restricted.

CAPABILITY UNIT IIIw-1

Somewhat poorly drained, nearly level soils that are underlain by a dense or brittle pan or claypan make up this capability unit. The root zone extends to a depth of 18 to 21 inches. The soils are slightly droughty, moderate to moderately low in fertility, and low in content of organic matter. The yield potential is moderately low. The following soils are in this group:

Johnsburg and Cavode silt loams, 0 to 2 percent slopes.
Lawrence silt loam.
Taft silt loam.
Tyler fine sandy loam.
Tyler silt loam.

These soils are fairly well suited to most of the crops commonly grown in the county, but they are not suited to bluegrass, orchardgrass, alfalfa, sericea lespedeza, and red clover. The soils should be used for meadow or pasture every other year. Draining them so that the ordinary crops can be grown is generally not feasible, and drainage is limited mainly to ditches. Because of the slow permeability of the pan layer, tile drainage is not effective in most places, although some areas of the Taft and Tyler soils are suitable for tiling. Study of a specific area must be made in the field to determine whether tile can be used.

CAPABILITY UNIT IIIw-2

Only one soil, Blago silt loam, 0 to 4 percent slopes, is in this capability unit. This very poorly drained, nearly level soil is dark colored and is high in organic matter. Its subsoil is fine textured. The yield potential is moderate.

This soil is not suited to small grains and tobacco, but it can be used to grow fescue, redtop, reed canarygrass, alsike clover, and Kobe lespedeza or Korean lespedeza. Draining this soil is generally feasible, but the depth over clay is a factor in determining whether tile drainage can be used.

CAPABILITY UNIT IIIw-3

This capability unit is made up only of Johnsburg and Cavode silt loams, 2 to 6 percent slopes. These gently sloping soils are somewhat poorly drained and are underlain by a dense or brittle pan or claypan. Their root zone extends to a depth of 12 to 21 inches. There is a moderate hazard of erosion. The soils are slightly to moderately droughty, moderate to moderately low in fertility, and low in content of organic matter. The yield potential is moderately low.

The soils in this unit are managed much like the soils of capability unit IIIw-1 and are used about the same. Because of the stronger slopes, however, practices to control erosion must be used on all but the short slopes.

CAPABILITY UNIT IIIw-5

This capability unit consists of deep, poorly drained soils on flood plains. The soils are moderately fertile, but in many places they are low in organic matter. The yield potential is moderately low. The following soils are in this unit:

Atkins silt loam.
Atkins silty clay loam.
Melvin silt loam.

These soils are difficult to drain because of the high water table. If suitable outlets can be found, tile drainage can be used, but the soils will still be rather wet. In areas that have been drained, fair yields are obtained of the crops that are commonly grown. If the soils have not been drained, they are generally suited only to pasture or woodland. Suitable pasture plants are fescue, redtop, reed canarygrass, alsike clover, ladino clover, and Kobe or Korean lespedeza.

CAPABILITY UNIT IIIw-7

Only one soil, Dunning silty clay loam, is in this capability unit. This very poorly drained, nearly neutral, dark-colored soil is on flood plains. It is high in organic matter and has a moderately fine textured surface layer. The soil has slow permeability and is rather difficult to work because of the moderately fine texture of the plow layer. Nevertheless, the yield potential is high.

This soil can be drained by tiling. Except for tobacco and small grains, it is suited to all the crops commonly grown in the county. Cropping can be intensive if a high level of management is used.

CAPABILITY UNIT IVe-1

Deep, well-drained, strongly sloping soils that are fertile and have a friable subsoil make up this capability unit. Most of these soils are eroded, and the hazard of further erosion is moderately high. The content of organic matter is low in the eroded areas, but the yield potential is moderately high. The following soils are in this capability unit:

Allegheny loam, 12 to 20 percent slopes.
Allegheny loam, 12 to 20 percent slopes, eroded.
Ashton silt loam, 12 to 20 percent slopes.
Elk silt loam, 12 to 20 percent slopes, eroded.
Hagerstown silt loam, 12 to 20 percent slopes, eroded.

Except for their stronger slope, these soils are similar to the soils of capability unit IIe-1 and IIIe-1. Where the slopes are 50 to 75 feet long, they need to be tilled on the contour. Where slopes are 250 to 300 feet long, the soils should be used only infrequently for cultivated crops or they should be stripcropped. Close-growing crops ought to be grown at least 3 years out of 4.

CAPABILITY UNIT IVe-2

The soils in this capability unit are well drained, strongly sloping, and slightly droughty. Their root zone extends to a depth of 16 to 32 inches. The hazard of erosion is moderately high, and the yield potential is moderately low. The following soils are in this capability unit:

Eden soils, 12 to 20 percent slopes, eroded.
Jefferson gravelly silt loam, 12 to 20 percent slopes.

These soils are only fairly well suited to cultivated crops. They are used extensively for pasture or meadow, which helps to control erosion. Suitable plants for pasture or meadow are fescue, redtop, timothy, trefoil, alsike clover, Korean lespedeza, and sericea lespedeza. The short slopes should be used only infrequently for cultivated crops, and they need to be tilled on the contour. On the longer slopes that have a gradient of as much as 16 percent, stripcropping should be used, and the cropping system ought to include several years of meadow or pasture.

CAPABILITY UNIT IVe-3

Deep, well-drained, strongly sloping soils that are moderately fertile make up this capability unit. The soils have a firm subsoil. Most of them are eroded, and the hazard of further erosion is moderately high. In the eroded areas the content of organic matter is low. The yield potential is moderate. The following soils are in this capability unit:

Beasley silty clay loam, 12 to 20 percent slopes, eroded.
Fleming silt loam, 12 to 20 percent slopes, eroded.
Fleming cherty silt loam, 12 to 20 percent slopes, eroded.
Lowell silt loam, 12 to 20 percent slopes, eroded.
Muse silt loam, 12 to 20 percent slopes.
Muse silty clay loam, 12 to 20 percent slopes, eroded.
Woolper silty clay loam, 12 to 20 percent slopes, eroded.

If well managed, these soils are suited to all of the legumes and grasses commonly grown in the county, except bromegrass. They are fairly well suited to other crops, but row crops can be grown only infrequently and tillage should be on the contour. Slopes 150 to 250 feet in length need to be stripcropped.

CAPABILITY UNIT IVe-4

Only one soil, Trappist silt loam, 12 to 20 percent slopes, eroded, is in this capability unit. This strongly sloping soil is moderately fertile. It is eroded, however, and the hazard of further erosion is moderately high. The root zone extends to a depth of 24 to 30 inches. The soil is slightly droughty, and the yield potential is moderately low.

This soil is not well suited to the cultivated crops commonly grown in the county, but it can be used for pasture or meadow. Suitable plants to grow for pasture or meadow are fescue, orchardgrass, redtop, red clover, sweetclover, and lespedeza. Row crops should be grown only infrequently. In the areas where the slopes are short, tillage should be on the contour. Stripcropping is necessary on the longer slopes.

CAPABILITY UNIT IVe-6

Sloping, slightly droughty soils make up this capability unit. The soils have a moderately fine textured or fine textured surface layer. Their root zone extends to a depth of 20 to 30 inches. The hazard of erosion is moderately high, and the yield potential is moderately low. The following soils are in this unit:

Fairmount flaggy silty clay loam, 6 to 12 percent slopes.
Lowell silty clay loam, shallow, 6 to 12 percent slopes, eroded.
Otway silty clay, 6 to 12 percent slopes.

Keeping erosion to a minimum on these soils is especially important because the underlying material is low in productivity. The soils should be kept in permanent vegetation most of the time, but they can be used for row crops occasionally if they are managed carefully. The management practices should include practices that help control erosion.

CAPABILITY UNIT IVe-8

This capability unit consists of sloping, droughty soils formed in material weathered from acid clay shale. The root zone of these soils extends to a depth of 12 to 27 inches. Because of the fine texture of the subsoil, permeability is moderately slow to slow. The hazard of erosion is moderately high, and the yield potential is moderately low. The following soils are in this capability unit:

Johnsburg and Cavode silt loams, 6 to 12 percent slopes.
Johnsburg and Cavode silt loams, 6 to 12 percent slopes, eroded.
Rarden silt loam, 6 to 12 percent slopes.
Rarden silty clay loam, 6 to 12 percent slopes, eroded.

These soils are low in productivity and are not well suited to the row crops commonly grown in the county. Row crops should be grown infrequently, if at all. If they are grown, suitable practices will be needed to help control erosion. Fescue, sericea lespedeza, and Korean lespedeza are suitable plants for pasture.

CAPABILITY UNIT IVe-11

Only one soil, Lowell silty clay loam, 6 to 12 percent slopes, severely eroded, is in this capability unit. This soil is sloping and severely eroded. Its surface layer is moderately fine textured. The root zone extends to a depth of 21 to 36 inches. The soil is low in content of organic matter. It is slightly to moderately droughty, and the hazard of further erosion is moderately high. The yield potential is moderately low.

This soil is only fairly well suited to the crops commonly grown in the county. Fescue and sericea lespedeza are suitable plants for permanent pasture. Bluegrass, orchardgrass, timothy, alfalfa, ladino clover, and red clover are suitable for short periods of pasture or meadow. Row crops can be grown only infrequently, and careful management will be needed to protect the soil from further erosion.

CAPABILITY UNIT IVw-1

Poorly drained, nearly level soils that are underlain by a dense or brittle layer make up this capability unit. The root zone of these soils extends only to a depth of 12 to 21 inches. The soils are moderately droughty and are low in content of organic matter. They are moderately low to low in fertility, and the yield potential is low to moderately low. The following soils are in this capability unit:

Guthrie silt loam.
Mullins silt loam.
Purdy silt loam.
Robertsville silt loam.

These soils are fairly well suited to fescue, redtop, reed canarygrass, ladino clover, and Kobe lespedeza, but they need surface drainage. In most areas ditches provide the only feasible type of drainage. Nevertheless, where the soils are in depressions and there is no suitable outlet, ditches are not feasible. Some areas of the Purdy and Robertsville soils can be tiled fairly successfully because the subsoil is less tight and compact than typical. Each area needs to be examined in the field, however, to determine if the soil is suitable for tiling.

CAPABILITY UNIT Vs-1

Only one soil, Huntington stony silt loam, shallow, is in this capability unit. This moderately deep, stony soil is on flood plains. It is slightly droughty, but the yield potential for forage crops is moderately high.

Because of the stones, this soil is suited only to pasture or woodland. It is suited to all of the grasses and legumes commonly grown for pasture, but bluegrass and whiteclover are grown more extensively for pasture than other plants.

CAPABILITY UNIT VIe-1

This capability unit consists of sloping to moderately steep soils that have a moderately fine textured surface layer. The root zone of these soils extends to a depth of approximately 20 inches. The soils are slightly droughty, and the hazard of further erosion is high. The yield potential is moderate for forage crops. The following soils are in this capability unit:

Beasley silty clay loam, 20 to 30 percent slopes, eroded.
Eden soils, 20 to 30 percent slopes, eroded.
Fairmount flaggy silty clay loam, 12 to 20 percent slopes.
Lowell silty clay loam, shallow, 12 to 20 percent slopes, eroded.
Lowell silty clay loam, shallow, 20 to 30 percent slopes, eroded.
Otway silty clay, 6 to 12 percent slopes, eroded.
Terrace escarpments.

These soils are poorly suited to row crops. For pasture or meadow, fescue, alfalfa, Korean lespedeza, and sericea lespedeza are the best to grow because they will live through dry periods. If special care is used and the areas are reseeded when necessary, Kentucky bluegrass, orchardgrass, birdsfoot trefoil, and sweetclover can be seeded. The seedbed needs to be prepared by using a heavy disk, or bush and bog. If it is necessary to plow the area, the pasture or meadow should be established in strips.

CAPABILITY UNIT VIe-2

Moderately deep, strongly sloping, severely eroded soils that have a fine textured or moderately fine textured surface layer make up this capability unit. For these soils, the hazard of further erosion is high. The content of organic matter is very low, and fertility is moderately low to moderate. The soils are slightly to moderately droughty, and the yield potential is moderately low for forage crops. The following soils are in this capability unit:

Beasley silty clay, 12 to 20 percent slopes, severely eroded.
Lowell silty clay loam, 12 to 20 percent slopes, severely eroded.

These soils are poorly suited to row crops, but they can be used for forage crops. They are better suited to fescue, redtop, Korean lespedeza, and sericea lespedeza than to other plants grown for forage. If special care is taken, however, orchardgrass, bluegrass, timothy, alfalfa, birdsfoot trefoil, red clover, and sweetclover will make fair yields for short periods. The preparation of the seedbed should be the same as that described for the soils of capability unit VIe-1.

CAPABILITY UNIT VIe-4

Sloping and strongly sloping, severely eroded soils that have a fine-textured surface layer make up this capability unit. The root zone of these soils extends only to a depth of 18 inches or less. The soils are moderate to moderately low in fertility and are very low in content of organic matter. They are droughty, and the yield potential for forage is moderately low. The following soils are in this capability unit:

Fairmount flaggy clay, 6 to 20 percent slopes, severely eroded.
Lowell silty clay, shallow, 12 to 20 percent slopes, severely eroded.

These soils are not well suited to row crops. Bluegrass, fescue, and sericea lespedeza are the best plants to grow for pasture.

CAPABILITY UNIT VIe-8

Sloping and strongly sloping soils of low fertility make up this capability unit. The soils developed in material weathered from clay shale. Their root zone extends to a depth of 12 to 27 inches. For these soils, the hazard of erosion is high. The soils are low in fertility, and the content of organic matter is low in the areas that are already eroded. The soils are droughty, and the yield potential for forage is moderately low. The following soils are in this capability unit:

Rarden silt loam, 12 to 20 percent slopes.
Rarden silty clay loam, 12 to 20 percent slopes, eroded.
Rockcastle silt loam, 12 to 20 percent slopes.
Shrouts silty clay loam, 6 to 20 percent slopes.

These soils are poorly suited to row crops, but they can be used for pasture. If good pasture management is used, the soils are suited to fescue, redtop, timothy, Kobe lespedeza, Korean lespedeza, and sericea lespedeza.

CAPABILITY UNIT VIs-1

Very rocky, sloping and strongly sloping, eroded soils make up this capability unit. The root zone of these soils extends to a depth of 12 to 36 inches. The hazard of further erosion is moderately high to high. These soils are slightly to moderately droughty. The yield potential for forage crops is moderate. The following soils are in this capability unit:

Fairmount-rock land complex, 6 to 20 percent slopes, eroded.
Lowell very rocky silty clay loam, 6 to 20 percent slopes, eroded.

These soils are not suited to row crops, but they can be used for pasture. The most suitable plants for pasture are fescue, redtop, Korean lespedeza, and sericea lespedeza. Bluegrass, orchardgrass, alfalfa, and ladino clover can be grown, but the stand does not last long.

CAPABILITY UNIT VIs-3

Sloping and strongly sloping, stony, shaly, or cherty soils make up this capability unit. The root zone of these soils extends to a depth of 1 to 3 feet. The hazard of erosion is moderate to high, and fertility is moderate to low. The soils are slightly to moderately droughty, and the yield potential for forage crops is low. The following soils are in this capability unit:

Colyer shaly silt loam, 12 to 20 percent slopes.
Fleming cherty silty clay loam, thin solum, 12 to 25 percent slopes.
Muskingum stony silt loam, 6 to 20 percent slopes.

These soils are not suited to row crops, but they can be used for pasture. Suitable plants for pasture are fescue, redtop, Korean lespedeza, and sericea lespedeza.

CAPABILITY UNIT VIIe-1

This capability unit consists of shallow to moderately deep, steep and moderately steep, droughty soils that have a moderately fine textured surface layer. The soils are eroded, and the hazard of further erosion is high. They are low in fertility and are suited only to woodland use, wildlife, or limited grazing. The following soils are in this capability unit:

Eden soils, 30 to 50 percent slopes, eroded.
Lowell silty clay loam, shallow, 30 to 50 percent slopes, eroded.
Lowell silty clay, shallow, 20 to 30 percent slopes, severely eroded.

Ordinarily, it does not pay to clear these soils for pasture. If they have been cleared or are within a larger area of other soils used for pasture, they can be used for grazing.

CAPABILITY UNIT VIIe-2

Shallow, moderately steep and steep soils make up this capability unit. For these soils, the hazard of further erosion is very high. The soils are droughty, low in fertility, and suited only to woodland use, wildlife, or very limited grazing. The following soils are in this capability unit:

Fairmount flaggy clay, 20 to 30 percent slopes, severely eroded.
Fairmount flaggy clay, 30 to 60 percent slopes, severely eroded.
Rockcastle silt loam, 20 to 30 percent slopes.
Rockcastle silt loam, 30 to 50 percent slopes.

These soils need to be used mainly for woodland or wildlife. If it is impractical to fence areas that are within a larger area of other soils used for pasture, the soils may remain in briers, bushes, or trees that will help protect them from livestock.

CAPABILITY UNIT VIIe-4

Only Gullied land is in this capability unit. Before deciding what management practices to use, each area of this land needs to be examined in the field to find the cause of the erosion and to determine how much soil material is left. Some areas of Gullied land ought to be leveled and seeded to permanent vegetation. Others will need to be planted to trees and protected from livestock. In some areas runoff from higher lying areas may need to be diverted to protect the land from further erosion.

CAPABILITY UNIT VIIs-1

Shallow and moderately deep, moderately steep and steep, shaly or stony soils make up this capability unit. For these soils, the hazard of erosion is very high. The soils are low in fertility and are suited only to woodland use, wildlife, or limited grazing. The following soils are in this capability unit:

Colyer shaly silt loam, 20 to 30 percent slopes.
Colyer shaly silt loam, 30 to 50 percent slopes.
Muskingum stony silt loam, 20 to 30 percent slopes.
Muskingum stony silt loam, 30 to 50 percent slopes.

If these soils are within a field that is used for pasture, the native vegetation may be grazed. In general, however, it is not practical to improve these soils for pasture. They are probably best kept in trees or used for wildlife areas.

CAPABILITY UNIT VIIs-2

Moderately steep, very rocky, eroded soils make up this capability unit. The root zone of these soils extends only to a depth of 12 to 18 inches. The hazard of further erosion is high, and the soils are suited only to woodland use, wildlife, or very limited grazing. The following soils are in this capability unit:

Fairmount-rock land complex, 20 to 30 percent slopes, eroded.
Lowell very rocky silty clay, 20 to 30 percent slopes, severely eroded.

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Improving these soils for pasture is not practical, and the best use probably is for woodland or wildlife. In areas not covered by trees, the native vegetation can be grazed. Grazing must be limited, however, so as to leave enough vegetation to help control erosion.

CAPABILITY UNIT VIIs-3

The soils in this capability unit are very shallow, sloping to very steep, and very droughty. Some of the soils are stony, and some are very droughty. Because of their severe limitations, the soils are suited only to woodland or wildlife. The following soils are in this capability unit:

Colyer shaly silt loam, 50 to 60 percent slopes.
Colyer shaly silty clay loam, 12 to 30 percent slopes, eroded.
Muskingum stony silt loam, 50 to 80 percent slopes.
Otway silty clay, 12 to 20 percent slopes, eroded.
Otway silty clay, 20 to 30 percent slopes, eroded.
Otway silty clay, 30 to 50 percent slopes, eroded.
Rockcastle silty clay, 12 to 20 percent slopes, eroded.
Rockcastle silty clay, 20 to 30 percent slopes, eroded.
Shrouts clay, 6 to 20 percent slopes, eroded.
Shrouts clay, 20 to 30 percent slopes, eroded.

These soils are highly susceptible to further erosion. Therefore, they need protection from livestock.

CAPABILITY UNIT VIIs-5

Only Rock land—land that has 25 to 90 percent of its surface covered by rocks—is in this capability unit. The use of this land is restricted mainly to woodland or wildlife. Where the slope is no greater than 30 percent, however, the native vegetation in areas that have been cleared can be grazed to a limited extent. Fencing some areas to keep out livestock may be feasible. Other areas, within larger areas used for pasture, can be protected by allowing a cover of bushy or woody plants to grow.

Soil Productivity

Table 2 lists the soils of Bath County and gives estimated average acre yields that may be expected from the principal crops grown under a high level of management. A high level of management includes several or many of the following practices:

1. Choosing well-suited, recommended varieties for planting.
2. Using a proper rate of seeding, planting at the right time, and employing efficient methods to harvest the crop.
3. Controlling weeds, insects, and diseases.
4. Applying the kind of fertilizer in amounts equal to or above the current recommendations of the Kentucky Agricultural Experiment Station or equal to or above the need shown by soil tests that are properly interpreted (7).
5. Applying adequate amounts of lime.
6. Draining naturally wet soils, where feasible.
7. Using a crop rotation that will help control erosion, maintain the structure of the soil, and add organic matter.
8. Applying applicable conservation measures, such as sod waterways, contour tillage, terracing, and stripcropping.
9. Using a cover crop and crop residues to increase the supply of organic matter in the soil and to help control erosion.
10. Using good pasture management practices.

In table 2 estimated yields are listed only where the soils were considered to be suitable for a particular crop; for example, corn yields were estimated for most of the soils in capability classes I through IV but were not estimated for soils in capability classes V or VI. Pasture yields are listed in units of cow-acre-days. This refers to the number of days during the grazing season that 1 acre will provide grazing for a cow, horse, or steer without injury to the pasture.

Higher yields than those indicated can be obtained, but the yields given are those that most farmers will find practical to reach if they apply the proper practices.

The level of management chosen by a farm operator depends on many things in addition to the kinds of soils. Before deciding what kind of management to use, the farm operator will consider probable prices, distance to market, the type of farm enterprise he wishes to follow, and many other factors. His choice of crops will also affect management. Different crops, planted on the same kind of soils, will require different management. Likewise, the same crop, planted on different soils, will require different management.

The estimates given in table 2 are based on the best information available. The information was obtained through interviews with farmers, with the local county agricultural agent, and with technicians of the Soil Conservation Service. The estimates also take into account observations soil scientists made while mapping the county. The estimates indicate relative productivity of the soils surveyed. The estimates are on a countywide basis, and, in making them, yields throughout the State were considered.

Woodland Management

The woodlands of Bath County are mainly in the mountainous eastern part of the county and in the area called the Knobs. In 1960, woodlands occupied 64,000 acres in the county. Of this, 17,575 acres was in farms, 13,957 acres was in the Cumberland National Forest, and 32,468 acres, not in farms, was privately owned.

Nearly 80 percent of the acreage that is wooded is covered by an oak-hickory type of forest. Other areas, once used for row crops or pasture, but later abandoned, are now covered by a pure stand of Virginia pine or by a mixture of oak and Virginia pine. In addition, on a few thousand acres of land that is underlain by limestone, redcedar has become established.

Because of frequent burning, grazing of the woodlands, and past logging practices, most of the wooded areas now support only trees of medium to low quality. Nevertheless, about 200 people in the county derive a major part of their cash income from the harvesting and processing of woodland products.

Those who derive much of their livelihood from owning or managing woodlands need to know several things about their soils. First, they need to know the potential productivity of their soils for different kinds of wood crops.

TABLE 2.—*Estimated average acre yields of crops*

[Where yields are not given, the soil is considered unsuitable for the crop]

Soil	Corn	Tobacco	Wheat	Alfalfa and grass hay	Red clover and grass hay	Korean lespedeza	Pasture
	Bu.	*Lb.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Cow-acre-days* [1]
Allegheny loam, 2 to 6 percent slopes	84	1,950	34	3.5	2.5	1.7	175
Allegheny loam, 6 to 12 percent slopes	80	1,900	32	3.4	2.4	1.6	171
Allegheny loam, 6 to 12 percent slopes, eroded	75	1,850	27	3.2	2.2	1.5	170
Allegheny loam, 12 to 20 percent slopes	70	1,800	23	3.1	2.1	1.4	169
Allegheny loam, 12 to 20 percent slopes, eroded	60	1,750	18	3.0	2.0	1.2	167
Ashton silt loam, 2 to 6 percent slopes	102	2,120	40	3.7	3.0	2.0	186
Ashton silt loam, 6 to 12 percent slopes	98	1,990	39	3.7	2.9	2.0	183
Ashton silt loam, 12 to 20 percent slopes	80	1,900	28	3.6	2.4	1.6	181
Atkins silt loam	65	1,540	23		2.0	1.3	160
Atkins silty clay loam	58	1,350	20		1.7	1.2	150
Beasley silt loam, 2 to 6 percent slopes	87	1,920	31	3.6	2.6	1.7	179
Beasley silty clay loam, 2 to 6 percent slopes, eroded	66	1,780	26	3.2	2.0	1.3	159
Beasley silty clay loam, 6 to 12 percent slopes, eroded	64	1,740	25	3.1	1.9	1.3	156
Beasley silty clay loam, 12 to 20 percent slopes, eroded							153
Beasley silty clay, 12 to 20 percent slopes, severely eroded							117
Beasley silty clay loam, 20 to 30 percent slopes, eroded							151
Bedford silt loam, 0 to 2 percent slopes	70	1,660	24		2.1	1.4	162
Bedford silt loam, 2 to 6 percent slopes	78	1,860	31	3.5	2.3	1.6	174
Blago silt loam, 0 to 4 percent slopes	90	1,600	36	3.6	2.7	1.8	180
Captina silt loam, 0 to 2 percent slopes	70	1,680	24		2.1	1.4	163
Captina silt loam, 2 to 6 percent slopes	78	1,790	31	3.5	2.3	1.6	174
Captina silt loam, 6 to 12 percent slopes, eroded	60	1,550	24	2.8	1.8	1.2	141
Colyer shaly silt loam, 12 to 20 percent slopes							120
Colyer shaly silt loam, 20 to 30 percent slopes							116
Colyer shaly silt loam, 30 to 50 percent slopes							60
Colyer shaly silt loam, 50 to 60 percent slopes							60
Colyer shaly silty clay loam, 12 to 30 percent slopes, eroded							60
Cruze silt loam, 2 to 8 percent slopes	90	1,750	32	3.4	2.7	1.8	170
Dunning silty clay loam	98	1,650	34	3.6	3.0	2.0	180
Eden soils, 12 to 20 percent slopes, eroded	55	1,585	22	3.0	1.6	1.1	148
Eden soils, 20 to 30 percent slopes, eroded							146
Eden soils, 30 to 50 percent slopes, eroded							
Egam silty clay loam	96	1,855	33	3.8	2.9	1.9	190
Elk silt loam, 2 to 6 percent slopes	105	2,130	40	3.8	3.0	2.0	188
Elk silt loam, 6 to 12 percent slopes, eroded	84	1,945	34	3.5	2.5	1.7	176
Elk silt loam, 12 to 20 percent slopes, eroded	76	1,850	30	3.5	2.3	1.5	174
Fairmount flaggy silty clay loam, 6 to 12 percent slopes	60	1,650	24	3.2	1.8	1.2	160
Fairmount flaggy silty clay loam, 12 to 20 percent slopes							156
Fairmount flaggy clay, 6 to 20 percent slopes, severely eroded							92
Fairmount flaggy clay, 20 to 30 percent slopes, severely eroded							88
Fairmount flaggy clay, 30 to 60 percent slopes, severely eroded							64
Fairmount-rock land complex, 6 to 20 percent slopes, eroded							66
Fairmount-rock land complex, 20 to 30 percent slopes, eroded							64
Fleming cherty silt loam, 12 to 20 percent slopes, eroded							138
Fleming cherty silty clay loam, thin solum, 12 to 25 percent slopes							130
Fleming silt loam, 6 to 12 percent slopes, eroded	68	1,745	27	3.1	2.0	1.4	153
Fleming silt loam, 12 to 20 percent slopes, eroded							150
Gullied land							89
Guthrie silt loam	38	1,050					143
Hagerstown cherty silt loam, 6 to 12 percent slopes, eroded	73	1,700	29	3.1	2.2	1.5	157
Hagerstown silt loam, 0 to 2 percent slopes	104	2,200	40	3.7	3.0	2.0	185
Hagerstown silt loam, 2 to 6 percent slopes	100	2,045	40	3.7	3.0	2.0	185
Hagerstown silt loam, 6 to 12 percent slopes, eroded	82	1,910	33	3.5	2.5	1.6	174
Hagerstown silt loam, 12 to 20 percent slopes, eroded	74	1,800	30	3.4	2.2	1.5	172
Huntington gravelly silt loam	92	1,800	32	3.6	2.8	1.8	180
Huntington silt loam	110	2,200	40	4.0	3.0	2.0	200
Huntington stony silt loam, shallow							170
Jefferson gravelly silt loam, 2 to 12 percent slopes	78	1,840	31	3.4	2.3	1.6	171
Jefferson gravelly silt loam, 12 to 20 percent slopes	69	1,790	28	3.4	2.1	1.4	169
Johnsburg and Cavode silt loams, 0 to 2 percent slopes	46	1,340	16				149
Johnsburg and Cavode silt loams, 2 to 6 percent slopes	51	1,470	18		1.5	1.0	149
Johnsburg and Cavode silt loams, 6 to 12 percent slopes	48	1,420	17		1.5	1.0	143

See footnote at end of table.

TABLE 2.—*Estimated average acre yields of crops*—Continued

[Where yields are not given, the soil is considered unsuitable for the crop]

Soil	Corn	Tobacco	Wheat	Alfalfa and grass hay	Red clover and grass hay	Korean lespedeza	Pasture
	Bu.	*Lb.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Cow-acre-days* [1]
Johnsburg and Cavode silt loams, 6 to 12 percent slopes, eroded	38	1,350					120
Landisburg cherty silt loam, 2 to 12 percent slopes	47	1,500	16				153
Lawrence silt loam	54	1,370	19		1.6	1.1	157
Lindside silt loam	98	2,040	34	4.0	3.0	2.0	198
Lowell silt loam, 2 to 6 percent slopes	95	2,040	38	3.6	2.9	1.9	182
Lowell silt loam, 2 to 6 percent slopes, eroded	82	1,940	33	3.5	2.5	1.6	173
Lowell silt loam, 6 to 12 percent slopes	90	1,960	36	3.5	2.7	1.8	176
Lowell silt loam, 6 to 12 percent slopes, eroded	76	1,720	30	3.4	2.3	1.5	168
Lowell silt loam, 12 to 20 percent slopes, eroded							165
Lowell silty clay loam, 6 to 12 percent slopes, severely eroded	55	1,400	22	2.7	1.7	1.1	135
Lowell silty clay loam, 12 to 20 percent slopes, severely eroded							133
Lowell silty clay, shallow, 12 to 20 percent slopes, severely eroded							107
Lowell silty clay, shallow, 20 to 30 percent slopes, severely eroded							105
Lowell silty clay loam, shallow, 2 to 6 percent slopes, eroded	64	1,700	26	3.1	1.9	1.3	154
Lowell silty clay loam, shallow, 6 to 12 percent slopes, eroded	53	1,400	21	3.0	1.6	1.1	150
Lowell silty clay loam, shallow, 12 to 20 percent slopes, eroded							148
Lowell silty clay loam, shallow, 20 to 30 percent slopes, eroded							146
Lowell silty clay loam, shallow, 30 to 50 percent slopes, eroded							60
Lowell very rocky silty clay loam, 6 to 20 percent slopes, eroded							95
Lowell very rocky silty clay, 20 to 30 percent slopes, severely eroded							60
Made land							
Melvin silt loam	72	1,590	25		2.2	1.4	170
Monongahela fine sandy loam, 2 to 6 percent slopes	62	1,600	25	3.0	1.9	1.3	153
Monongahela fine sandy loam, 6 to 12 percent slopes	58	1,520	23	2.9	1.7	1.2	145
Monongahela fine sandy loam, 6 to 12 percent slopes, eroded	50	1,500	20	2.5	1.5	1.0	126
Monongahela silt loam, 0 to 2 percent slopes	70	1,660	24		2.1	1.4	160
Monongahela silt loam, 2 to 6 percent slopes	74	1,780	29	3.4	2.2	1.5	168
Monongahela silt loam, 6 to 12 percent slopes	64	1,620	26	3.2	1.9	1.3	161
Monongahela silt loam, 6 to 12 percent slopes, eroded	56	1,580	22	2.8	1.7	1.1	138
Mullins silt loam	34	1,200					136
Muse silt loam, 6 to 12 percent slopes	78	1,830	31	3.4	2.3	1.6	172
Muse silt loam, 12 to 20 percent slopes							169
Muse silty clay loam, 6 to 12 percent slopes, eroded	75	1,790	30	3.1	2.3	1.5	156
Muse silty clay loam, 12 to 20 percent slopes, eroded							153
Muskingum stony silt loam, 6 to 20 percent slopes							142
Muskingum stony silt loam, 20 to 30 percent slopes							140
Muskingum stony silt loam, 30 to 50 percent slopes							60
Muskingum stony silt loam, 50 to 80 percent slopes							60
Newark silt loam	87	1,620	30		2.6	1.7	185
Nicholson silt loam, 0 to 6 percent slopes	93	1,950	37	3.6	2.8	1.9	179
Otway silty clay, 6 to 12 percent slopes	64	1,700	26	3.2	1.9	1.3	160
Otway silty clay, 6 to 12 percent slopes, eroded							80
Otway silty clay, 12 to 20 percent slopes, eroded							78
Otway silty clay, 20 to 30 percent slopes, eroded							76
Otway silty clay, 30 to 50 percent slopes, eroded							60
Philo silt loam	93	1,950	37	3.8	2.8	1.9	188
Pope fine sandy loam	80	1,750	28	3.3	2.4	1.6	165
Pope gravelly silt loam	88	1,800	31	3.4	2.6	1.8	170
Pope silt loam	105	2,090	37	3.8	3.0	2.0	190
Purdy silt loam	36	1,250					139
Rarden silt loam, 2 to 6 percent slopes	58	1,600	23	3.0	1.8	1.2	150
Rarden silt loam, 6 to 12 percent slopes	50	1,425	20	2.9	1.5	1.0	147
Rarden silt loam, 12 to 20 percent slopes							140
Rarden silty clay loam, 6 to 12 percent slopes, eroded							114
Rarden silty clay loam, 12 to 20 percent slopes, eroded							112

See footnote at end of table.

TABLE 2.—*Estimated average acre yields of crops*—Continued

[Where yields are not given, the soil is considered unsuitable for the crop]

Soil	Corn	Tobacco	Wheat	Alfalfa and grass hay	Red clover and grass hay	Korean lespedeza	Pasture
	Bu.	*Lb.*	*Bu.*	*Tons*	*Tons*	*Tons*	*Cow-acre-days* [1]
Robertsville silt loam	38	1, 300					144
Rockcastle silt loam, 12 to 20 percent slopes							140
Rockcastle silt loam, 20 to 30 percent slopes							135
Rockcastle silt loam, 30 to 50 percent slopes							
Rockcastle silty clay, 12 to 20 percent slopes, eroded							72
Rockcastle silty clay, 20 to 30 percent slopes, eroded							70
Rock land							
Sees silty clay loam, 2 to 6 percent slopes	90	1, 520	31	3. 6	2. 7	1. 8	180
Sees silty clay loam, 6 to 12 percent slopes	80	1, 750	32	3. 5	2. 4	1. 6	174
Sequatchie silty clay loam, heavy variant, 0 to 4 percent slopes	105	2, 200	40	3. 9	3. 0	2. 0	195
Shelbyville silt loam, 2 to 6 percent slopes	102	2, 140	40	3. 7	3. 0	2. 0	185
Shelbyville silt loam, 6 to 12 percent slopes	95	1, 980	38	3. 6	2. 9	1. 9	182
Shelbyville silt loam, 6 to 12 percent slopes, eroded	85	1, 900	34	3. 5	2. 5	1. 7	174
Shrouts silty clay loam, 6 to 20 percent slopes							120
Shrouts clay, 6 to 20 percent slopes, eroded							64
Shrouts clay, 20 to 30 percent slopes, eroded							60
Stendal silt loam	85	1, 570	30		2. 5	1. 7	174
Taft silt loam	53	1, 360	18		1. 6	1. 1	159
Terrace escarpments							100
Tilsit silt loam, 2 to 6 percent slopes	73	1, 760	29	3. 3	2. 2	1. 5	165
Tilsit silt loam, 6 to 12 percent slopes	68	1, 650	27	3. 1	2. 0	1. 4	157
Trappist silt loam, 2 to 6 percent slopes	82	1, 900	33	3. 4	2. 5	1. 6	172
Trappist silt loam, 6 to 12 percent slopes, eroded	73	1, 740	29	3. 1	2. 2	1. 5	154
Trappist silt loam, 12 to 20 percent slopes, eroded							151
Tyler fine sandy loam	45	1, 320	16				145
Tyler silt loam	48	1, 390	17			1. 0	152
Whitwell silt loam	88	1, 670	31		2. 6	1. 8	185
Woolper silty clay loam, 2 to 6 percent slopes	84	1, 950	33	3. 6	2. 5	1. 7	180
Woolper silty clay loam, 6 to 12 percent slopes	80	1, 800	32	3. 5	2. 4	1. 6	174
Woolper silty clay loam, 12 to 20 percent slopes, eroded							155

[1] The number of days 1 acre will support one cow, horse, or steer without injury to the pasture.

Secondly, they need to know the limitations to woodland production that they will encounter in managing the soils. These limitations include the hazards of gully erosion, natural restrictions on use of woodland equipment, plant competition, and seedling mortality. The owner or manager of woodlands will also need to know what wood crops to favor in existing stands and what species are suitable for planting. To aid managers in obtaining this information, the soils suitable for woodland have been placed in woodland suitability groups. A woodland suitability group consists of soils that require similar kinds of conservation practices and other management and that have comparable potential productivity.

The woodland suitability groups in this county are listed in table 3. Table 3 is followed by tables 4, 5, 6, and 7, which give the potential productivity of Virginia pine, yellow-poplar, shortleaf pine, and upland oaks.

In table 3 are listed the limitations that affect use of each site for woodland. The degree of limitation is indicated by the relative terms *slight*, *moderate*, and *severe*. The following defines the hazards and limitations described in table 3:

Hazard of gully erosion refers to the potential hazard of erosion when a soil is used as woodland. In determining the rating for this hazard, it was assumed that the woodlands had been protected satisfactorily from fire and from grazing by livestock. Steepness of slope, length of slope, and soil texture were the dominant factors that influenced the rating. The woodland management operations that control the development of gullies are the proper construction, location, and maintenance of roads and skid trails.

Equipment limitations refers to those characteristics of the soils or topography that restrict or prohibit the use of equipment commonly used to tend crops or to harvest trees. The dominant factors that limit the use of equipment are slope, seasonal wetness, rough terrain, and obstacles, such as rocks or ledges.

Plant competition refers to the degree of competition from other plants and the rate that undesirable species invade different soils when openings are made in the canopy. The dominant factors that govern such competition are the characteristics of the soil and topography that affect the availability of moisture in the soil during the growing season.

Seedling mortality refers to the failure of seedlings to grow in a normal environment after adequate natural seeding has taken place or after suitable seedlings have been planted. For plantations, it was assumed that the planting stock was healthy, that it was of acceptable grade for planting, and that it was planted properly.

TABLE 3.—*Woodland suitability groups*

Woodland suitability group and mapping symbol of soil	Site index [1]					Hazard of gully erosion
	Upland oak	Virginia pine	Shortleaf pine	Yellow-poplar	Redcedar	
Group 1 Colyer shaly silt loams: CoD, CoE, CoF, CoG. Colyer shaly silty clay loam: CsE2. Muskingum stony silt loams: [3] MuE, MuF, MuG.	57±4	54±4	47	(2)	(2)	Severe
Group 2 Rockcastle silty clays: RsD2 RsE2.	51±4	48±3	(4)	(2)	(2)	Severe
Group 3 Muskingum stony silt loams: [5] MuD, MuE, MuF, MuG. Rockcastle silt loams: RkD, RkE, RkF.	58±4	60±4	57±5	(2)	(2)	Severe
Group 4 Muskingum stony silt loams: [6] MuD, MuE, MuF, MuG.	76±5	75±3	78	95±5	(2)	Severe
Group 5 Allegheny loams: AgB, AgC, AgC2, AgD, AgD2.	(4)	73	(4)	(4)	(2)	Moderate to severe
Group 6 Monongahela fine sandy loams: MfB, MfC, MfC2. Monongahela silt loams: MgB, MgC, MgC2.	62±4	67	(4)	(2)	(2)	Moderate
Group 7 Johnsburg and Cavode silt loams: JoB, JoC, JoC2.	54±4	57±4	(4)	(2)	(2)	Moderate
Group 8 Muse silt loams: MnC, MnD. Muse silty clay loams: MsC2, MsD2. Rarden silt loams: RaB, RaC, RaD. Rarden silty clay loams: RcC2, RcD2. Trappist silt loams: TtB, TtC2, TtD2.	59±4	62±3	57	(4)	(2)	Moderate to severe
Group 9 Atkins silt loams: At. Atkins silty clay loams: Ay. Johnsburg and Cavode silt loams: JoA. Monongahela silt loams: MgA. Mullins silt loams: Mm. Purdy silt loams: Pr. Tyler fine sandy loams: Tv. Tyler silt loams: Ty.	63±3	64	(2)	(2)	(2)	Slight
Group 10 Eden soils: EdD2, EdE2, EdF2. Fairmount flaggy clays: FaD3, FaE3, FaF3. Fairmount flaggy silty clay loams: FfC, FfD. Fairmount-rock land complexes: FmD2, FmE2. Otway silty clays: OtC, OtC2, OtD2, OtE2, OtF2. Rock land: Rt. Shrouts clays: ShD2, ShE2. Shrouts silty clay loams: SsD.	(2)	(2)	(2)	(2)	42±4	Moderate to severe

[1] The site index indicates the potential productivity of a soil. Where measurements were taken on four or more sample areas, standard deviations were calculated to indicate the differences that were found in measuring. Where no figure for standard deviation is given, measurements were taken on fewer than four sample areas.

[2] Species generally does not grow on these soils or is of little importance.

for soils used for wood crops

Equipment limitations	Plant competition	Seedling mortality	Suitable wood crop	Species suitable for planting
Severe to very severe	Slight to moderate	Moderate to severe	Oak-pine	Shortleaf pine; loblolly pine.
Severe	Slight	Severe	Oak-pine	Shortleaf pine; loblolly pine.
Moderate to very severe.	Moderate	Moderate	Oak-pine	Shortleaf pine; loblolly pine; white pine.
Moderate to very severe.	Severe	Slight	Yellow-poplar	Shortleaf pine; loblolly pine; white pine; black locust; black walnut.
Slight to severe	Severe	Slight	Yellow poplar	Shortleaf pine; loblolly pine; white pine; black locust; black walnut.
Slight to moderate	Moderate	Slight	Oak-pine	Shortleaf pine; loblolly pine; white pine.
Slight to moderate	Moderate	Slight	Oak-pine	Shortleaf pine; loblolly pine.
Slight to severe	Moderate	Slight	Oak-pine	Shortleaf pine; loblolly pine; white pine.
Slight to moderate	Severe	Slight	Oaks	Pin oak; sweetgum; bald cypress; sycamore; cottonwood.
Moderate to very severe.	Slight to severe	Moderate to severe	Redcedar	Redcedar.

[3] Includes only the areas on ridgetops, on the upper one-third of south- and west-facing slopes, and on the upper one-fifth of north- and east-facing slopes.

[4] Information not available.

[5] Includes only lower two-thirds of the south- and west-facing slopes.

[6] Includes only lower four-fifths of the north- and east-facing slopes.

For naturally occurring seedlings, it was assumed that the supply of seed was adequate. The environment was assumed to be natural for both the planted and for natural seedlings. The ratings indicate the probable need for replanting. They also indicate the soils on which desirable species cannot be expected to regenerate naturally.

In addition to the limitations just described, suitable wood crops are indicated in table 3. These are the species or mixtures of species that normally develop the best combination of tree crop and cover. The information given in table 3 to indicate suitable wood crops was based on inspections on the site and has only limited research support. Factors studied to determine the most suitable wood crop were the site index, the quality of the trees, and the density of the development in existing natural stands. No final priority among the different wood crops is intended, but the information given indicates the wood crop that appears to be the best at the present time. The following describes suitable wood crops.

Oak-pine. For this wood crop, the stand consists generally of a mixture of one or more species of oak (black, white, scarlet, or chestnut) with one or more species of pine (Virginia, shortleaf, or pitch). Other species may be present, but the ones listed are the most important. Stands of pure pine are considered to be a component of this wood crop.

Yellow-poplar. As a rule, this wood crop consists of pure stands of yellow-poplar or of a mixture in which yellow-poplar is the major component. In most of the stands, other desirable upland hardwoods are present.

Oaks. This wood crop generally consists of a pure stand of a single species or of a mixture of upland oaks. On a poorly drained site, the major component may be pin oak.

Redcedar. This wood crop consists essentially of a pure stand of redcedar with minor components of such species as chinquapin oak, maple, and elm.

In table 3 the species indicated as suitable for planting are the ones than can be planted successfully on the specific soil.

To determine the relationship between the kind of soil and growth of trees, and thus to obtain the appraisals of productivity given in tables 4, 5, 6, and 7, trees growing on 143 sites were studied.[3] Five important species of trees, or forest cover types, were studied. These were upland oak, Virginia pine, shortleaf pine, yellow-poplar, and redcedar. Information could not be obtained for each species or for each forest cover type on all the soils in the study area, or plot. Nevertheless, each study area was selected to represent, as accurately as was practical, a specific kind of wood crop growing on a recognized kind of soil. Also, all feasible precautions were taken to see that measurements were confined to well-stocked, naturally occurring, even-aged, unmanaged forest stands not adversely affected by grazing of livestock, fire, insects, or disease.

In each plot 2 to 10 healthy trees that have always been dominant or codominant in the stand were measured. The average height and average age of these measured trees were used to obtain the site index, which is considered to be the best indicator of the potential productivity of a soil. The information concerning the stand and yield for different site indexes and for trees of different ages was obtained mainly from the results of basic research by the U.S. Forest Service. Thus, the information given in tables 4, 5, 6, and 7, along with the information given in table 3, will be helpful to owners of woodlands in considering alternate uses of the soils, in selecting the best wood crops to grow, and in determining the feasibility of applying different intensities of management.

A number of studies show that several topographic features, for example, the steepness of the slope and its position, affect the growth of trees (*2*, *4*, *12*). Trees typically grow better on slopes that face north or east (azimuth readings between 340 degrees and 125 degrees) than on slopes that face south or west. This needs to be considered in determining the kind of woodland management to use.

[3] Information about the individual plots is filed in the State office of the Soil Conservation Service, Lexington, Ky.

TABLE 4.—*Yield information for well-stocked, unmanaged, naturally occurring stands of Virginia pine*

[Data extracted and interpreted from N. C. Agr. Expt. Sta. Tech. Bul. 100 (*10*)].

Site index	Age	Total volume per acre		Total height
	Years	*Cu. ft.* [1]	*Cords* [2]	*Number*
50	20	960	10. 7	24
	30	2, 000	22. 2	35
	40	2, 700	30. 0	44
	50	3, 100	34. 4	50
	60	3, 400	37. 7	55
	70	3, 600	40. 0	58
60	20	1, 600	17. 7	28
	30	2, 650	29. 4	42
	40	3, 630	40. 3	53
	50	4, 300	47. 7	60
	60	4, 720	52. 4	65
	70	5, 050	56. 1	68
70	20	1, 700	18. 8	34
	30	3, 200	35. 5	49
	40	4, 360	48. 4	62
	50	5, 200	57. 7	70
	60	5, 700	63. 3	76
	70	6. 150	68. 3	79
80	20	1, 950	21. 6	39
	30	3, 500	38. 8	55
	40	4, 900	54. 4	70
	50	5, 800	64. 4	80
	60	6, 430	71. 4	86
	70	6, 900	76. 6	91

[1] Peeled volume of all stems 4 feet in diameter breast height or larger. Merchantable top limit 4 inches inside bark.
[2] A conversion factor of 90 cubic feet to 1 cord was used.

Woodland suitability groups

The woodland suitability groups in Bath County are described on the following pages. Not all of the soils in the county were placed in a woodland suitability group. Some soils were not included in a group, because they occupy only a small acreage, and a few were not included in a group, because they are unsuited to the production of wood crops. Other soils were not included because they are now used for pasture or cultivated crops and likely

TABLE 5.—*Average stand and yield information for well-stocked, unmanaged, naturally occurring stands of yellow-poplar*

[Data extracted and interpreted from USDA Tech. Bul. 356 (*5*)]

Site index	Age	Volume per acre			Total average height of dominant trees	Average diameter at breast height	Total trees per acre
		Cubic feet [1]	Board feet International rule [2]	Board feet Doyle rule [3]			
	Years				*Feet*	*Inches*	*Number*
90	20	1,180	2,000	0	61	6.6	252
	25	1,745	5,100	0	69	7.4	268
	30	2,300	8,710	0	75	8.3	260
	35	2,845	12,450	0	80	9.2	246
	40	3,390	16,300	6,350	84	10.1	230
	45	3,935	20,300	8,100	87	11.1	212
	50	4,480	24,400	12,000	90	12.2	194
100	20	1,475	3,400	0	68	6.9	264
	25	2,145	7,600	0	76	7.8	269
	30	2,800	12,150	0	83	8.8	252
	35	3,450	16,800	6,500	88	9.9	236
	40	4,085	21,790	8,500	93	10.9	218
	45	4,710	26,880	13,000	97	12.0	198
	50	5,330	32,150	15,700	100	13.2	176
110	20	1,765	5,180	0	75	7.2	266
	25	2,550	10,200	0	84	8.2	264
	30	3,320	15,600	6,100	91	9.3	244
	35	4,070	21,250	8,300	97	10.5	224
	40	4,800	27,350	13,400	102	11.6	204
	45	5,510	33,750	16,500	106	12.9	184
	50	6,220	40,200	23,000	110	14.1	164
120	20	2,040	7,000	0	81	7.5	264
	25	2,900	13,100	0	91	8.6	256
	30	3,770	19,250	7,500	99	9.8	234
	35	4,600	25,900	10,000	106	11.1	212
	40	5,410	33,150	16,200	111	12.4	190
	45	6,200	40,700	23,200	116	13.6	168
	50	6,970	48,450	27,000	120	14.9	148

[1] Peeled volume of stem, excluding 1-foot stump and top less than 3 inches in diameter inside bark.
[2] International log rule.
[3] Doyle log rule. These values were obtained by applying percentage corrections to the values given for the International log rule, according to table 43A, Forestry Handbook.

will be used in the same way for a long time to come. Measurable stands of trees are not common on any of these soils, and, therefore, an average site index rating was not determined. Soils of the following series were not placed in a woodland suitability group:

Ashton (AsB, AsC, AsD).
Beasley (BaB, BcB2, BcC2, BcD2, BcE2, BeD3).
Bedford (BfA, BfB).
Blago (BoB).
Captina (CaA, CaB, CaC2).
Cruze (CzB).
Dunning (Du).
Egam (Eg).
Elk (EkB, EkC2, EkD2).
Fleming (FnD2, FoD, FsC2, FsD2).
Gullied land (Gn).
Guthrie (Gu).
Hagerstown (HaC2, HgA, HgB, HgC2, HgD2).
Huntington (Hn, Hs, Hu).
Jefferson (JeC, JeD).
Landisburg (LaB).
Lawrence (Lc).
Lindside (Ld).
Lowell (LoB, LoB2, LoC, LoC2, LoD2, LpC3, LpD3, LrB2, LrC2, LrD2, LrE2, LrF2, LsD3, LsE3, LvD2, LwE3).
Made land (Ma).
Melvin (Me).
Newark (Ne).
Nicholson (NkB).
Philo (Ph).
Pope (Pm, Pn, Po).
Robertsville (Re).
Sees (SaB, SaC).
Sequatchie (ScA).
Shelbyville (SeB, SeC, SeC2).
Stendal (St).
Taft (Ta).
Terrace escarpments (Tc).
Tilsit (TsB, TsC).
Whitwell (Wh).
Woolper (WoB, WoC, WoD2).

WOODLAND SUITABILITY GROUP 1

This group is made up of shallow to very shallow, somewhat excessively drained soils of uplands that are strongly sloping to very steep (see table 3). The soils are medium

TABLE 6.—*Average stand and yield information for well-stocked, unthinned, naturally occurring stands of shortleaf pine*

[Data extracted from USDA Miscellaneous Publication 50 (*16*)]

Site index	Age	Total volume per acre			Average height of dominant trees	Average diameter total stand [1]	Total trees per acre [1]
		Cubic feet unpeeled	*Cords rough wood* [2]	*Board feet Doyle rule* [3]			
	Years				*Feet*	*Inches*	*Number*
50	20	0	0	0	25	2. 5	3, 425
	30	2, 040	23	0	35	3. 9	1, 855
	40	2, 980	33	0	44	5. 1	1, 085
	50	3, 970	43	1, 600	50	6. 1	760
	60	4, 430	48	3, 200	55	6. 9	590
	70	4, 780	51	5, 050	59	7. 6	485
	80	5, 050	53	7, 000	62	8. 3	420
60	20	1, 060	12	0	30	2. 9	2, 520
	30	2, 880	32	0	42	4. 6	1, 370
	40	4, 200	46	1, 550	52	6. 0	815
	50	5, 080	54	4, 350	60	7. 2	570
	60	5, 690	60	7, 600	66	8. 2	445
	70	6, 170	65	10, 250	71	9. 0	370
	80	6, 520	68	12, 700	74	9. 8	315
70	20	1, 600	18	0	34	3. 5	1, 965
	30	3, 720	41	750	49	5. 4	1, 060
	40	5, 210	56	4, 000	61	7. 0	625
	50	6, 250	66	8, 650	70	8. 3	440
	60	7, 000	73	12, 600	77	9. 4	345
	70	7, 580	79	16, 250	82	10. 4	285
	80	8, 020	83	19, 400	86	11. 2	240
80	20	2, 190	25	0	39	4. 1	1, 495
	30	4, 420	48	1, 950	56	6. 2	815
	40	6, 100	65	7, 650	70	8. 0	485
	50	7, 380	77	13, 550	80	9. 5	335
	60	8, 250	85	18, 850	88	10. 8	260
	70	8, 920	92	23, 450	94	11. 9	215
	80	9, 460	97	27, 550	99	12. 9	185

[1] Stand 2 inches in diameter breast height or larger.
[2] Stand 4 inches in diameter breast height or larger.
[3] Stand 9 inches in diameter breast height or larger.

to moderately fine textured and formed in material weathered from sandstone and shale. The following soils are in this group:

- Colyer shaly silt loam, 12 to 20 percent slopes.
- Colyer shaly silt loam, 20 to 30 percent slopes.
- Colyer shaly silt loam, 30 to 50 percent slopes.
- Colyer shaly silt loam, 50 to 60 percent slopes.
- Colyer shaly silty clay loam, 12 to 30 percent slopes, eroded.
- Muskingum stony silt loam, 20 to 30 percent slopes (ridges and upper slopes).
- Muskingum stony silt loam, 30 to 50 percent slopes (ridges and upper slopes).
- Muskingum stony silt loam, 50 to 80 percent slopes (ridges and upper slopes).

Only the parts of the Muskingum soils on ridges and slopes are in this group; that is, the areas on tops of ridges, the upper third of west- and south-facing slopes, and the upper fifth of south- and east-facing slopes.

The average site index for upland oaks on these soils is 57. It is 54 for Virginia pine, and 47 for shortleaf pine. Trees grow very slowly on these soils after they are 50 years of age. The soils appear to be best suited to the production of pulpwood, mine props, and other small wood products.

The hazard of gully erosion, with reference to woodland, was rated as severe for all the soils of group 1 because of the steepness of the slope. Special care is required in locating, constructing, and maintaining roads and skid trails, and all woodland operations need to be across the slope.

Equipment limitations are rated as severe for the areas where the slope is between 12 and 30 percent. For these areas, wheel-type tractors and farm trucks can be used only on roads that have been well constructed; track-type equipment is more suitable than other types of mechanical equipment.

Where the slope is greater than 30 percent, equipment limitations are rated as very severe. This is because constructing and maintaining roads and trails is more costly than in the less sloping areas, and winches and other more specialized pieces of equipment are needed. In some areas of Muskingum soils, rocks form an obstacle and are likely to damage equipment. This factor was also considered in rating the soils according to equipment limitations.

Plant competition was rated as slight for Colyer shaly silty clay loam, 12 to 30 percent slopes, eroded. A rating of slight was also given for the areas of Muskingum soils on ridgetops and on the upper one-third of the south- and west-facing slopes. A rating of moderate was given the other areas of Muskingum soils and for the other Colyer soils of the group.

For the areas where a rating of slight was given, pine seedlings, either volunteer or planted, will develop satisfactorily without maintenance weeding after the canopy of trees has been removed. For the areas rated as moder-

TABLE 7.—*Average stand and yield information for well-stocked, unthinned, naturally occurring stands of second-growth upland oaks*

[Data extracted and interpreted from USDA Tech. Bul. 560 (*9*)]

Site index	Age	Volume				Average height of dominant and codominant trees	Average diameter breast height	Trees per acre [1]
		Cubic feet [2]	Cords [2]	Board feet (International rule) [3]	Board feet (Doyle rule) [4]			
	Years	*Cubic feet*	*Cords*	*Board feet*	*Board feet*	*Feet*	*Inches* [4]	*Number*
50	30	540	6. 3	350	0	33	3. 4	1, 246
	40	1, 090	12. 8	1, 400	0	42	4. 5	789
	50	1, 600	18. 8	3, 230	0	50	5. 3	623
	60	2, 080	24. 5	5, 600	0	56	6. 1	507
	70	2, 510	29. 5	8, 150	0	60	6. 9	419
	80	2, 900	34. 1	10, 450	0	62	7. 5	375
	90	3, 230	38. 0	12, 600	0	64	8. 1	346
	100	3, 520	41. 4	14, 700	0	65	8. 7	320
60	30	880	10. 3	850	0	41	4. 0	965
	40	1, 580	18. 6	3, 200	0	51	5. 3	611
	50	2, 230	26. 2	6, 300	0	60	6. 3	482
	60	2, 800	32. 9	9, 700	0	67	7. 2	390
	70	3, 290	38. 7	12, 800	0	71	8. 0	326
	80	3, 730	43. 9	15, 650	0	75	8. 8	292
	90	4, 120	48. 5	18, 300	0	77	9. 4	268
	100	4, 480	52. 7	20, 900	8, 150	79	10. 1	248
70	30	1, 270	14. 9	1, 750	0	48	4. 6	743
	40	2, 090	24. 6	5, 500	0	60	6. 0	472
	50	2, 830	33. 3	9, 750	0	70	7. 2	374
	60	3, 480	40. 9	13, 900	0	78	8. 3	304
	70	4, 030	47. 4	17, 700	0	83	9. 3	252
	80	4, 510	53. 1	21, 200	8, 300	87	10. 2	224
	90	4, 960	58. 3	24, 500	9, 500	90	11. 0	207
	100	5, 400	63. 5	27, 650	13, 500	92	11. 7	192
80	30	1, 690	19. 9	3, 350	0	56	5. 3	578
	40	2, 610	30. 7	8, 600	0	69	6. 9	366
	50	3, 450	40. 6	13, 750	0	80	8. 3	290
	60	4, 160	48. 9	18, 600	0	89	9. 5	235
	70	4, 770	56. 1	23, 100	9, 000	95	10. 7	196
	80	5, 340	62. 8	27, 250	13, 300	99	11. 7	174
	90	5, 870	69. 1	30, 950	15, 200	103	12. 7	161
	100	6, 380	75. 1	34, 400	19, 600	105	13. 6	148

[1] Stand 0.6 inch diameter breast height and larger.
[2] Merchantable stem to 4-inch top outside bark.
[3] International log rule; total board feet per acre to a 5-inch top.
[4] Doyle log rule; these values were obtained by applying percentage corrections to the values given for the International log rule according to table 43A, Forestry Handbook.

ate, one or two weedings are normally required to release the volunteer or planted pine seedlings.

On all of the soils of this group, oak seedling sprouts will provide adequate regeneration, without weeding, after the mature oaks have been harvested. In areas formerly used as cropland or pasture, but recently abandoned, competition from undesirable plants is slight for volunteer or planted pines on all the soils of this group.

Seedling mortality is rated as severe for the Colyer shaly silty clay loam, and for the areas of Muskingum soils on ridgetops and on the upper fifth of south- and west-facing slopes. For these areas, a period of drought lasting 2 or more weeks in May or early in June will destroy a stand of newly germinated pines almost completely, and it will cause the stand of newly planted pines to be poor. Seedling mortality is rated as moderate for the other soils of group 1. On the other soils of the group, a period of drought that lasts for 2 or more weeks in May or early in June will cause the stand of newly germinated pines to be poor, but it will not adversely affect the stand of newly planted pines.

The wood crop that appears to develop best on the soils of this group is a mixture of Virginia pine and scarlet or chestnut oak, or any one of these species grown in a pure stand. In a few places shortleaf pine also grows on these soils. Although the site index for shortleaf pine grown on these soils is generally lower than that of the oaks or of Virginia pine, the quality of shortleaf pine is better than that of Virginia pine and the various kinds of oaks.

The species suitable for planting are shortleaf and loblolly pine. Normally, Virginia pine is not planted, because of the close spacing required for this species to develop a well-formed tree.

Shortleaf pine and loblolly pine are the most suitable species to plant on the soils of group 1.

WOODLAND SUITABILITY GROUP 2

In this group (see table 3) are shallow, somewhat excessively drained, fine-textured soils of uplands that are strongly sloping to steep. The soils developed in material weathered from acid clay shale. They are slowly permeable, and in most places they are eroded. The following soils are in this group:

Rockcastle silty clay, 12 to 20 percent slopes, eroded.
Rockcastle silty clay, 20 to 30 percent slopes, eroded.

The average site index for upland oak on these soils is 51. It is 48 for Virginia pine. Trees grow very slowly on these soils after they reach 50 years of age. The soils appear to be best suited to the production of pulpwood, mine props, and other small wood products.

The hazard of gully erosion for these soils used as woodland is rated as severe because of the steepness of the slope. Where feasible, woodland operations should be across the slope. Attention should be given to locating, constructing, and maintaining roads and skid trails so that runoff will not concentrate and cause gullies to form.

Equipment limitations are severe for these soils because of the steepness of the slope and the roughness of the terrain. Trucks and wheel-type tractors can be used only in areas where the roads and trails have been well constructed. Track-type equipment is suitable for general use.

Seedling mortality is severe. A period of drought lasting 2 or more weeks in May or early in June will almost completely destroy a stand of newly germinated pines. It will also cause a stand of newly planted pines to be poor.

The wood crop that appears to develop best on the soils of this group is a mixture of Virginia pine and scarlet or chestnut oak.

The species suitable for planting are shortleaf and loblolly pines.

WOODLAND SUITABILITY GROUP 3

This group (see table 3) consists mainly of areas of shallow, somewhat excessively drained to excessively drained, medium-textured soils of uplands, but it includes small areas of colluvial soils that were mapped with the Muskingum soils. The included soils are on benches and toe slopes. They occupy from 5 to 10 percent of the total acreage in the group.

The Rockcastle soils in this group are strongly sloping to very steep and developed in material weathered from acid clay shale. Their surface layer is medium textured, and their subsoil is clayey and slowly permeable. The areas of Muskingum soils are sloping to very steep and developed in material weathered from sandstone, shale, and siltstone. Their root zone extends to a greater depth than that of the Rockcastle soils. The following soils are in this group:

Muskingum stony silt loam, 6 to 20 percent slopes (lower two-thirds of south- and west-facing slopes).
Muskingum stony silt loam, 20 to 30 percent slopes (lower two-thirds of south- and west-facing slopes).
Muskingum stony silt loam, 30 to 50 percent slopes (lower two-thirds of south- and west-facing slopes).
Muskingum stony silt loam, 50 to 80 percent slopes (lower two-thirds of south- and west-facing slopes).
Rockcastle silt loam, 12 to 20 percent slopes.
Rockcastle silt loam, 20 to 30 percent slopes.
Rockcastle silt loam, 30 to 50 percent slopes.

For the Rockcastle soils and for the areas of Muskingum soils that are in this group, the average site index for upland oaks is 58. It is 60 for Virginia pine, and 57 for shortleaf pine. For the included areas of colluvial soils, the site index for these same species is 10 to 20 feet higher than that of the Rockcastle and Muskingum soils. Trees do not grow rapidly on the soils of this group, but their growth is satisfactory for the production of sawlogs.

The hazard of gully erosion, for these soils used as woodland, is severe because of the steepness of the slope. If feasible, woodland operations should be across the slope. Attention needs to be given to the location, construction, and maintenance of roads and skid trails so that runoff will not concentrate and cause gullies.

Equipment limitations are moderate for areas of the soils where the slope is less than 12 percent. Where the slope is between 12 and 30 percent, limitations to the use of equipment are severe and track-type vehicles are needed for most woodland operations that require the use of mechanical equipment. Where the slope is more than 30 percent, limitations to the use of equipment are very severe. In such areas the use of track-type vehicles is more restricted and other special equipment may be required. In some areas of the Muskingum soils, rocks are an obstacle. This factor was considered in determining a rating for limitations to the use of equipment.

Plant competition is moderate on the soils of this group. In areas where the canopy of trees has been recently removed, one or two weedings are necessary to release the desirable seedlings that have grown up naturally or that have been planted. Generally, trees that are newly planted on open land require some weeding if the land was abandoned as cropland or pasture more than 5 years ago.

Seedling mortality is moderate on the soils of this group. A drought that lasts 2 or more weeks in May or early in June will cause a stand of newly germinated pine seedlings to be poor. However, newly planted pine seedlings will survive satisfactorily a drought of 3 weeks in May or early in June.

The most suitable wood crop appears to be a mixture containing two or more of the following species: Black oak, chestnut oak, shortleaf pine, and Virginia pine.

Shortleaf pine, loblolly pine, and white pine are all suitable species for planting on these soils.

WOODLAND SUITABILITY GROUP 4

Areas of moderately deep, somewhat excessively drained to excessively drained, medium-textured soils of uplands make up most of the acreage in this group (see table 3). Small areas of colluvial soils on benches and toe slopes are also included. The included areas occupy from 5 to 10 percent of the total acreage. The soils are sloping to steep and formed in material weathered from sandstone and shale. Only the lower four-fifths of the north- and east-facing slopes of the following soils are in this group:

Muskingum stony silt loam, 6 to 20 percent slopes.
Muskingum stony silt loam, 20 to 30 percent slopes.
Muskingum stony silt loam, 30 to 50 percent slopes.
Muskingum stony silt loam, 50 to 80 percent slopes.

For the areas of Muskingum soils included in group 4, the site index for upland oaks is 76. It is 75 for Virginia pine, 78 for shortleaf pine, and 95 for yellow-poplar. For the included areas of colluvial soils, the site index for

these same species is about 10 to 20 feet more than for the areas of Muskingum soils in the group. Trees grow rapidly on all the areas. The yield and quality of sawlogs and veneer logs can be increased with intensive management.

The hazard of gully erosion is severe in the woodlands because of the steepness of the slope. Where feasible, woodland operations should be across the slope. Attention should be given to the location, construction, and maintenance of roads and skid trails so that runoff will not concentrate and cause gullies.

Equipment limitations are moderate for farm trucks and wheel-type tractors where the slope is less than 12 percent. Where the slope is between 12 and 30 percent, the limitations are severe for farm trucks and wheel-type tractors; track-type vehicles are needed for most of the woodland operations that require the use of mechanical equipment. For areas where the slope is greater than 30 percent, the limitations to the use of equipment are very severe. Track-type vehicles are needed, and there are definite restrictions to their use. Winches and other specialized equipment may be required in such areas. Rocks are a hazard in some areas. This factor was considered in determining a rating for the soils.

Plant competition is severe. After the canopy of trees has been removed, intensive weeding is necessary so that the desirable vegetation can regenerate. Ordinarily, planting is a successful way of restocking existing woodlands only if very costly weeding has taken place. Normally, competition is severe in stands of newly planted pines on open land that was abandoned as cropland or pasture 2 or more years ago. Such areas can be used successfully for pine only when the areas have been abandoned recently.

The most suitable wood crop appears to be yellow-poplar. All upland species grow rapidly, however, and can develop into trees of high quality.

The species suitable for planting are black locust, yellow-poplar, black walnut, white pine, shortleaf pine, and loblolly pine.

WOODLAND SUITABILITY GROUP 5

Deep, well-drained, medium-textured, gently sloping to strongly sloping soils of terraces make up this group (see table 3). The soils formed in material weathered from sandstone and shale. The following soils are in this group:

Allegheny loam, 2 to 6 percent slopes.
Allegheny loam, 6 to 12 percent slopes.
Allegheny loam, 6 to 12 percent slopes, eroded.
Allegheny loam, 12 to 20 percent slopes.
Allegheny loam, 12 to 20 percent slopes, eroded.

The site index for Virginia pine is 73 for these soils. Information on the site index for other species is not available, nor is a satisfactory basis for estimating such an index. Trees grow fairly rapidly on these soils. Intensive management for the production of sawlogs of high quality appears to be the most logical use of the soils.

The hazard of gully erosion is moderate on slopes of 12 percent or less and severe on slopes of more than 12 percent. Where feasible, woodland operations should be across the slope. Attention ought to be given to locating, constructing, and maintaining roads and skid trails so that runoff will not concentrate and cause new gullies.

Equipment limitations are moderate where the slope is between 6 and 12 percent. The use of wheel-type tractors and trucks is somewhat restricted on eroded areas because of the moderate slope and uneven terrain. Equipment limitations are severe on slopes of more than 12 percent; track-type vehicles should be used for skidding and similar operations if mechanical equipment is used.

Plant competition is severe after the canopy of trees is removed. Intensive weeding is often necessary so that desirable plants will regenerate naturally and be dominant in the stand. Unless costly weeding is done, planting is ordinarily not a successful way of restocking existing woodlands. Competition is usually severe to newly planted trees on areas formerly used as cropland or pasture but abandoned 2 or more years ago.

The most suitable wood crop to grow for soils of this group appears to be yellow-poplar. All of the upland species grow fairly rapidly, however, and the mature trees may be of high quality if they are properly managed.

Species suitable for planting are black locust, yellow-poplar, black walnut, white pine, shortleaf pine, and loblolly pine.

WOODLAND SUITABILITY GROUP 6

Moderately deep, moderately well drained, gently sloping to sloping soils of terraces make up this woodland suitability group (see table 3). The soils developed in material weathered from sandstone and shale. They have a medium-textured fragipan, and some are moderately eroded. The following soils are in this group:

Monongahela fine sandy loam, 2 to 6 percent slopes.
Monongahela fine sandy loam, 6 to 12 percent slopes.
Monongahela fine sandy loam, 6 to 12 percent slopes, eroded.
Monongahela silt loam, 2 to 6 percent slopes.
Monongahela silt loam, 6 to 12 percent slopes.
Monongahela silt loam, 6 to 12 percent slopes, eroded.

The site index for upland oaks is 62 for these soils. It is 67 for Virginia pine. The trees grow rapidly enough to make a small sawlog rotation practical.

The hazard of gully erosion is moderate if these soils are used as woodland. The steeper slopes are typically short. Roads and skid trails should be located, constructed, and maintained so that runoff will not concentrate and cause gullies.

Equipment limitations are moderate on these soils where the slope is more than 6 percent. On slopes that are eroded, the use of wheel-type tractors and farm trucks is somewhat restricted by the steepness of the slope and the uneven terrain.

Plant competition is moderate on these soils. Normally, if the canopy of trees is removed, adequate restocking will take place naturally. Some weeding will usually be necessary so that the desired trees will dominate. On open land that was once used as cropland or pasture, but that was abandoned more than 4 years ago, some weeding is normally required where the trees have been newly planted.

The wood crop that appears to develop the best combination of desirable characteristics consists of a mixture of Virginia pine, black oak, southern red oak, and white oak.

The species suitable for planting are shortleaf, loblolly, and white pines.

WOODLAND SUITABILITY GROUP 7

In this group (see table 3) are somewhat poorly drained to moderately well drained, shallow, gently sloping to sloping soils of the uplands. The soils have a fine-textured subsoil or a fragipan. In some places they are moderately eroded. They developed mainly in material weathered from acid shale. The following soils are in this group:

Johnsburg and Cavode silt loams, 2 to 6 percent slopes.
Johnsburg and Cavode silt loams, 6 to 12 percent slopes.
Johnsburg and Cavode silt loams, 6 to 12 percent slopes, eroded.

The site index for upland oaks is 54 and for Virginia pine it is 57. Trees grow slowly on these soils. The soils appear to be best suited to the production of pulpwood, mine props, and other small wood products.

The hazard of gully erosion is moderate because of the slope. The stronger slopes are typically short, but, on all of the soils, roads and skid trails should be located, constructed, and maintained so as to avoid concentration of runoff that may cause gullies.

Equipment limitations are moderate in areas where the slope is greater than 6 percent. On slopes that are eroded, the use of wheel-type tractors and farm trucks is somewhat restricted because of the uneven terrain.

Plant competition is moderate on the soils of this group. After the canopy of trees has been removed, adequate restocking will take place naturally, but some weeding will usually be necessary so that the desirable trees will dominate. If trees are planted after the canopy of trees has been removed, some weeding will also be required so that the newly planted trees will dominate. Normally, if trees are newly planted on areas formerly used as cropland or pasture, but abandoned more than 4 years ago, some weeding is required.

Seedling mortality is moderate on these soils. If a period of drought lasts for 2 or more weeks in May or early in June, the stand resulting from natural regeneration will be poor. Pines that have been newly planted will normally survive such a period of drought.

The wood crop that appears to develop the best combination of desirable characteristics on these soils is a mixture of Virginia pine, black oak, and white oak.

Shortleaf and loblolly pines are the species suitable for planting.

WOODLAND SUITABILITY GROUP 8

The soils of this group are deep to moderately deep, well drained, and gently sloping to strongly sloping (see table 3). They have a medium-textured surface layer. The lower part of the subsoil is fine textured. The soils developed in material weathered from shale. The Muse soils are on toe slopes, and the Rarden and Trappist soils are on uplands. In the soils of this group, permeability is moderately slow in the lower part of the subsoil. Some of the soils are eroded. The following soils are in this group:

Muse silt loam, 6 to 12 percent slopes.
Muse silt loam, 12 to 20 percent slopes.
Muse silty clay loam, 6 to 12 percent slopes, eroded.
Muse silty clay loam, 12 to 20 percent slopes, eroded.
Rarden silt loam, 2 to 6 percent slopes.
Rarden silt loam, 6 to 12 percent slopes.
Rarden silt loam, 12 to 20 percent slopes.
Rarden silty clay loam, 6 to 12 percent slopes, eroded.
Rarden silty clay loam, 12 to 20 percent slopes, eroded.
Trappist silt loam, 2 to 6 percent slopes.
Trappist silt loam, 6 to 12 percent slopes, eroded.
Trappist silt loam, 12 to 20 percent slopes, eroded.

The site index for upland oak is 59. It is 62 for Virginia pine, and 57 for shortleaf pine. The trees grow rapidly enough that the soils can be used in a sawlog rotation.

The hazard of gully erosion is moderate on slopes of 12 percent or less. It is severe on slopes of more than 12 percent. Where feasible, woodland operations should be across the slope. Attention should be given to locating, constructing, and maintaining roads and skid trails so that runoff will not concentrate and cause new gullies to form. Equipment limitations are moderate where the slope is between 6 and 12 percent. On the moderate slopes the use of wheel-type tractors and trucks is somewhat restricted. The use of these vehicles is also somewhat restricted on eroded areas because of the uneven terrain. Where the slope is greater than 12 percent, the limitations to the use of equipment are severe. Track-type vehicles should be used for skidding and similar operations if mechanical equipment is to be used.

Plant competition is moderate on the soils of this group. After the canopy of trees has been removed, adequate restocking will take place naturally, but some weeding will usually be necessary so that the desirable trees will dominate. If trees are planted after the canopy of trees has been removed, some weeding will also be required so that the newly planted trees will dominate. Normally, some weeding is required if trees are newly planted on areas formerly used as cropland or pasture, but abandoned more than 4 years ago.

The wood crop that appears to develop the best combination of desirable characteristics on these soils is a mixture of two or more of the following species: Black oak, white oak, Virginia pine, and shortleaf pine.

The species suitable for planting are shortleaf, loblolly, and white pines.

WOODLAND SUITABILITY GROUP 9

This group (see table 3) consists of nearly level, somewhat poorly drained to poorly drained soils of terraces and uplands. All but the Atkins soils have a fragipan. The Atkins soils are poorly drained and are subject to frequent overflow. The following soils are in this group:

Atkins silt loam.
Atkins silty clay loam.
Johnsburg and Cavode silt loams, 0 to 2 percent slopes.
Monongahela silt loam, 0 to 2 percent slopes.
Mullins silt loam.
Purdy silt loam.
Tyler fine sandy loam.
Tyler silt loam.

The site index for upland oaks is 63 for the soils of this group. It is 64 for Virginia pine. Trees grow rather slowly on these soils, but their growth is rapid enough for a small sawlog rotation to be successful.

Equipment limitations are moderate on all of the soils, but the Monongahela, because of excess wetness. For a period of 1 to 3 months during the winter or early in spring, the use of equipment is restricted. Limitations to the use of equipment are slight on the Monongahela soil.

Plant competition is severe on these soils after the canopy of trees has been removed. Black gum, dogwood, red maple, and other seedlings and saplings in the understory dominate new seedling sprouts of the desirable oaks.

Normally, an intensive weeding effort is required so that the desired oaks will dominate. Because of the intense competition, planting is normally not a suitable means of restocking the stand after the canopy of trees has been removed. Trees can be planted on open land that was used as cropland or pasture but was abandoned more than 2 years ago. However, intensive weeding will be required.

The wood crop that appears to develop the best combination of desirable characteristics on these soils is a mixture containing two or more of the following species: White oak, black oak, southern red oak, and pin oak.

Species suitable for planting are pin oak, sweetgum, bald cypress, sycamore, and cottonwood.

WOODLAND SUITABILITY GROUP 10

This group (see table 3) consists of shallow, fine-textured, alkaline soils of uplands. The soils are sloping to very steep, and most of them are eroded. They developed in material weathered from limestone, calcareous shale, and marl. The following soils are in this group.

Eden soils, 12 to 20 percent slopes, eroded.
Eden soils, 20 to 30 percent slopes, eroded.
Eden soils, 30 to 50 percent slopes, eroded.
Fairmount flaggy clay, 6 to 20 percent slopes, severely eroded.
Fairmount flaggy clay, 20 to 30 percent slopes, severely eroded.
Fairmount flaggy clay, 30 to 60 percent slopes, severely eroded.
Fairmount flaggy silty clay loam, 6 to 12 percent slopes.
Fairmount flaggy silty clay loam, 12 to 20 percent slopes.
Fairmount-rock land complex, 6 to 20 percent slopes, eroded.
Fairmount-rock land complex, 20 to 30 percent slopes, eroded.
Otway silty clay, 6 to 12 percent slopes.
Otway silty clay, 6 to 12 percent slopes, eroded.
Otway silty clay, 12 to 20 percent slopes, eroded.
Otway silty clay, 20 to 30 percent slopes, eroded.
Otway silty clay, 30 to 50 percent slopes, eroded.
Rock land.
Shrouts clay, 6 to 20 percent slopes, eroded.
Shrouts clay, 20 to 30 percent slopes, eroded.
Shrouts silty clay loam, 6 to 20 percent slopes.

The site index for redcedar is 42. Information about the normal yield of redcedar is not available. Some field checks, however, indicate a potential production of more than 1,200 posts per acre during a 50-year period. For redcedar, the rate of growth is fair to slow. Consequently, a rotation for fence posts or small bolts is most feasible.

The hazard of gully erosion is moderate where the slope is 12 percent or less. It is severe where the slope is more than 12 percent. Special care is required in locating, constructing, and maintaining roads and skid trails so that runoff will not concentrate and cause new gullies. Where feasible, woodland operations should be across the slope.

Equipment limitations are moderate where the slope is between 6 and 12 percent. On the moderate slopes the use of wheel-type tractors and farm trucks is somewhat restricted. In areas that are eroded, the use of these vehicles is also somewhat restricted because of the uneven terrain. Where the slope is between 12 and 30 percent, the limitations to the use of equipment are severe. If mechanical equipment is to be used, track-type vehicles are needed for skidding and similar operations. Where the slope is more than 30 percent, limitations to the use of equipment are very severe. In such areas the construction of roads and trails is costly, and winches and other specialized equipment are needed. In many places there are rock ledges, which are a limiting factor in the use of equipment.

Plant competition is slight on the Fairmount flaggy clays and on the Otway silty clays. It is severe on the Eden soils, and moderate on the rest of the soils. Some weeding is necessary in areas where competition from undesirable plants is moderate, so that naturally regenerated or planted redcedar will dominate. More intensive weeding is required where the rating is severe.

Seedling mortality in naturally occurring stands of redcedar is severe on the Fairmount flaggy clays and on the Otway silty clays, and moderate for the rest of the soils in the group. On the Fairmount flaggy clays and Otway silty clays, a drought that lasts 2 weeks or longer will destroy a stand of new seedlings. Where seedling mortality is moderate, more than 1 year is required for an adequate stand of naturally occurring seedlings to become established.

The most suitable wood crop to grow on these soils is redcedar, and it is the only kind of tree that should be considered for planting. Pine develops very poorly, and all the hardwoods grow slowly and are poorly formed. Normally, a satisfactory volunteer stand of redcedar will become established if brush or hardwoods of low quality have not been allowed to grow.

Engineering Characteristics of Soils

This section of the soil survey report contains information that the engineer can use to—

1. Make soil and land use studies that will aid in selecting and developing industrial, business, residential, and recreational sites.
2. Make preliminary estimates of the engineering properties of soils in planning agricultural drainage systems, farm ponds, irrigation systems, and systems of diversion channels and terraces.
3. Make preliminary evaluations of soil and ground conditions that will aid in selecting locations for highways or airports and in planning detailed investigations of the selected locations.
4. Locate probable sources of gravel and other materials needed in construction.
5. Correlate performance of the engineering structure with soil mapping units and thus develop information that will be useful in designing and maintaining the structure.
6. Determine the suitability of soil mapping units for the cross-country movement of vehicles and construction equipment.
7. Supplement the information obtained by engineers from other published maps, reports, and aerial photographs.
8. Develop other preliminary estimates for construction purposes pertinent to the particular area.

The mapping and description of the soils are somewhat generalized. The report, therefore, should be used only in planning more detailed field surveys to determine the in-place condition of the soil material at the site proposed for engineering construction.

Some of the terms used in this section and in other parts of the report are those employed by soil scientists, and they may not be familiar to engineers. Also, some terms, for example, soil, clay, silt, and sand, seem familiar but have a special meaning in soil science that does not

correspond with the meaning ordinarily understood in engineering. Most of these terms, as well as other special terms, are defined in the Glossary at the back of the report.

Some of the information useful in engineering can be obtained from the soils map. It will often be necessary, however, to refer to other parts of the report. By using the information in the soils map, the profile descriptions, and the tables in this section, the soils engineer can plan a detailed survey of the soil at the construction site. Then, after he has made a detailed survey and has tested the soils and observed their behavior in structures and foundations, he can estimate design requirements for the different soils shown on the map.

Engineering descriptions of the soils

This section is intended as a reference guide and not as a manual for using soil materials in engineering. In it a brief description of the soils of the county is given in table 8 and certain characteristics are described that are significant to engineering. The description includes the kind of underlying rock and the name of the rock formation if it is known. A more complete description of each soil is given in the section "Descriptions of Soils." Many of the facts in table 8 were based on information taken from Bulletin FHA No. 373 of the Federal Housing Administration (*3*).

Depth to a seasonally high water table cannot be determined accurately for many of the soils on uplands. This is because depth to the water table varies as the result of variations in elevation and because of variations in the underlying rocks.

In table 8 the soils are classified according to the textural classes of the U.S. Department of Agriculture, which are based on the relative proportions of sand, silt, and clay in the soil. Each important layer is also classified according to the AASHO and the Unified systems. The

TABLE 8.—*Brief description of the soils*

Symbol on map	Soil name	Description of soil and site	Depth to bedrock	Depth to seasonally high water table	Depth from surface
			Feet		*Inches*
AgB AgC AgC2 AgD AgD2	Allegheny loam, 2 to 6 percent slopes. Allegheny loam, 6 to 12 percent slopes. Allegheny loam, 6 to 12 percent slopes, eroded. Allegheny loam, 12 to 20 percent slopes. Allegheny loam, 12 to 20 percent slopes, eroded.	Loam, 1 foot thick, over firm clay loam 2 feet thick; the underlying material is stratified gravel and sand; the soils are well drained and are on old, high stream terraces in the Irvine formation.	More than 5.	More than 20 feet.	0 11 11–37 37–50
AsB AsC AsD	Ashton silt loam, 2 to 6 percent slopes. Ashton silt loam, 6 to 12 percent slopes. Ashton silt loam, 12 to 20 percent slopes.	Silt loam, 1½ feet thick, over firm silty clay loam 1½ feet thick; below is very firm silty clay that is 1 to more than 5 feet thick; the soils are well drained and are on toe slopes of local alluvium.	More than 5.	More than 10 feet.	0–18 18–36 36–50
At	Atkins silt loam.	Silt loam, 2 feet thick, over silty clay 2 feet thick; below are layers of silt, fine sand, and clay of variable thicknesses; this soil is poorly drained and is on first bottoms.	More than 5.	At the surface.	0–25 25–48+
Ay	Atkins silty clay loam.	Silty clay loam, 1 foot thick, over stratified silt, fine sand, and clay 2 to more than 10 feet thick; this soil is poorly drained and is on first bottoms.	More than 5.	At the surface.	0–15 15–48+
BaB BcB2 BcC2 BcD2 BcE2 BeD3	Beasley silt loam, 2 to 6 percent slopes. Beasley silty clay loam, 2 to 6 percent slopes, eroded. Beasley silty clay loam, 6 to 12 percent slopes, eroded. Beasley silty clay loam, 12 to 20 percent slopes, eroded. Beasley silty clay loam, 20 to 30 percent slopes, eroded. Beasley silty clay, 12 to 20 percent slopes, severely eroded.	Silt loam and silty clay loam, 1 foot thick, over firm silty clay or clay 2 to 4 feet thick; calcareous at a depth of about 2 feet and rests on sandy dolomitic limestone; the soils are well drained and are on uplands underlain by marl.	4 to 10	More than 20 feet.	0–7 7–11 11–26 26–46 46+
BfA BfB	Bedford silt loam, 0 to 2 percent slopes. Bedford silt loam, 2 to 6 percent slopes.	Silt loam, 2 feet thick, over compact silty clay loam that is 2 to 3 feet thick; below is dolomitic limestone (Boyle); the soils are moderately well drained and have a fragipan at a depth of 24 inches; they are on uplands.	3 to 6	1 to 2 feet (Perched water table).	0–14 14–24 24–40 40–48 48+

See footnote at end of table.

AASHO and the Unified classification systems are described near the end of this section under "Engineering Classification Systems."

The columns that show the percentage passing through sieves of various sizes indicate the relative amounts of coarse-grained material. The percentage passing the No. 200 sieve is the fine-grained fraction of the material.

Some features of a soil may be helpful in one kind of engineering work and a hindrance in another. For example, a highly permeable substratum would make a soil unsuitable as a site for a farm pond, but the soil might be favorable for another kind of engineering work. Table 8 gives estimated permeability for each important layer, that is, an estimate of the probable rate of water percolation through undisturbed soil material. The rate is expressed in inches per hour.

The column that shows available water capacity gives the amount of water held in the soil after a heavy rain or after irrigation water has been added. The available water capacity is expressed in terms of inches per inch of soil material.

The column showing reaction gives the degree of acidity or alkalinity of the different layers in the soil profile, expressed in pH values. The pH values given in this column were based on the results of quick tests made with Soiltex.

The shrink-swell potential indicates the volume change of the soil material to be expected with changes in content of moisture. The terms used to describe the shrink-swell potential are *low*, *moderate*, and *high*. In general, soils classed as CH and A–7 have high shrink-swell potential. Clean, structureless sand and gravel (single grain) and soil materials that have only a small amount of nonplastic to slightly plastic fines, as well as most nonplastic to slightly plastic soil material, have low shrink-swell potential.

and their estimated physical properties

Classification			Percentage passing sieve—			Permeability	Available water capacity	Reaction	Shrink-swell potential
Dominant USDA texture	Unified	AASHO	No. 4	No. 10	No. 200				
						Inches per hour	*Inches per inch*	*pH value*	
Loam	ML–CL	A–4	95–100	90–100	50–70	2. 5–5. 0	0. 18	5. 0–6. 5	Low.
Sandy clay loam to clay loam.	CL	A–6	95–100	95–100	55–85	0. 8–2. 5	. 18	4. 0–5. 5	Moderate.
Sandy clay loam	ML or CL	A–6	95–100	90–100	60–80	0. 8–2. 5	. 17	4. 0–4. 5	Moderate.
Silt loam	ML–CL	A–4	95–100	95–100	75–95	2. 5–5. 0	. 22	5. 5–6. 5	Low.
Silty clay loam	CL	A–6	95–100	95–100	85–95	0. 8–2. 5	. 19	5. 0–6. 5	Moderate.
Silty clay	CH	A–7	100	98–100	95–100	0. 2–0. 8	. 16	5. 0–5. 5	High.
Silt loam	ML–CL	A–6	95–100	95–100	75–95	2. 5–5. 0	. 22	4. 5 6. 0	Moderate.
Silty clay loam	CL	A–6	95–100	95–100	85–95	0. 8–2. 5	. 19	4. 0–4. 5	Moderate.
Silty clay loam	CL	A–6	95–100	95–100	85–95	0. 8–2. 5	. 19	4. 0–4. 8	Moderate.
Silty clay	CH	A–7	100	98–100	90–100	0. 2–0. 8	. 16	4. 0–4. 4	High.
Silt loam	ML–CL	A 4	95–100	95–100	75–95	2. 5 – 5. 0	. 22	5. 5–6. 0	Low.
Silty clay loam	CL	A–6	95–100	95–100	85–95	0. 8 – 2. 5	. 19	5. 5–6. 0	Moderate.
Silty clay	CH	A–7	100	98–100	90–100	0. 2 – 0. 8	. 16	5. 5–6. 5	High.
Clay	CH	A–7	100	98–100	95–100	0. 05– 0. 8	. 14	6. 5–7. 5	High.
Bedrock									
Silt loam	ML–CL	A–4 or A–6	95–100	95–100	75–95	0. 8 – 2. 5	. 22	5. 0–5. 5	Moderate.
Silty clay loam	CL	A–4, A–6	95–100	95–100	80–95	0. 2 – 0. 8	. 19	5. 0–5. 5	Moderate.
Silty clay loam	CL	A–6	95–100	95–100	85–95	0. 05– 0	[1]	5. 0–5. 5	Moderate.
Silty clay loam	CL	A–6	95–100	95–100	85–95	0. 05– 0	. 19	4. 0–5. 0	Moderate.
Bedrock									

TABLE 8.—*Brief description of the soils and*

Symbol on map	Soil name	Description of soil and site	Depth to bedrock	Depth to seasonally high water table	Depth from surface
			Feet		*Inches*
BoB	Blago silt loam, 0 to 4 percent slopes.	Silt loam and silty clay loam high in organic matter; 1 to 2 feet thick over very firm silty clay or clay 2 to 10 feet thick; this soil is dark colored and poorly drained to very poorly drained; it is on stream terraces.	More than 5.	At the surface (Perched water table).	0–8 8–21 21–30 30–48+
CaA CaB CaC2	Captina silt loam, 0 to 2 percent slopes. Captina silt loam, 2 to 6 percent slopes. Captina silt loam, 6 to 12 percent slopes, eroded.	Silt loam, 1 foot thick, over silty clay one-half foot thick; below is silty clay loam fragipan 2 to 2½ feet thick; underlain by stratified gravel, sand, silt, and clay 3 to 15 feet thick; the soils are moderately well drained; on stream terraces.	More than 5.	1 to 2 feet (Perched water table).	0–13 13–21 21–30 30–40 40+
CoD CoE CoF CoG CsE2	Colyer shaly silt loam, 12 to 20 percent slopes. Colyer shaly silt loam, 20 to 30 percent slopes. Colyer shaly silt loam, 30 to 50 percent slopes. Colyer shaly silt loam, 50 to 60 percent slopes. Colyer shaly silty clay loam, 12 to 30 percent slopes, eroded.	Silt loam, one-half foot thick over firm silty clay loam or silty clay ½ to 1 foot thick; below is brittle, black fissile shale (Ohio); the soils are somewhat excessively drained; they are on uplands; commonly the 3- to 4-inch layer directly above the bedrock is 40 percent shale fragments more than 1 inch across.	1 to 3	More than 20 feet.	0–6 6–14 14+
CzB	Cruze silt loam, 2 to 8 percent slopes.	Silt loam, 1 to 2 feet thick, over firm silty clay loam 1½ feet thick; below is very firm silty clay 1 to 10 feet thick; this soil is moderately well drained and is on toe slopes or alluvial fans.	More than 5.	1 to 2 feet (Seepage spots).	0–19 19–38 38–50+
Du	Dunning silty clay loam.	Firm silty clay loam high in organic matter and ½ foot to 1 foot thick; below is very firm silty clay or clay 2 to 8 feet thick over limestone; this soil is dark colored and is poorly drained; it is on first bottoms.	More than 5.	At the surface.	0–7 7–24 24–48+
EdD2 EdE2 EdF2	Eden soils, 12 to 20 percent slopes, eroded. Eden soils, 20 to 30 percent slopes, eroded. Eden soils, 30 to 50 percent slopes, eroded.	Firm silty clay loam, one-half foot thick, over firm silty clay that is one-half foot thick; below is very firm clay that is 1 to 2 feet thick over interbedded siltstone, shale, and limestone (Eden); the soils are somewhat excessively drained and are on hillsides.	2 to 4	More than 20 feet.	0–5 5–12 12–32 32+
Eg	Egam silty clay loam.	Firm silty clay loam, one-half foot thick, over very firm silty clay 2 to 7 feet thick; the silty clay overlies limestone; this soil is fine textured and is moderately well drained; it is on first bottoms.	3 to 8	1 to 3 feet	0–7 7–48+
EkB EkC2 EkD2	Elk silt loam, 2 to 6 percent slopes. Elk silt loam, 6 to 12 percent slopes, eroded. Elk silt loam, 12 to 20 percent slopes, eroded.	Silt loam, 1 to 1½ feet thick, over friable to firm silty clay loam 3 feet thick; below is stratified silt, clay, gravel, and chert 4 to more than 10 feet thick; the soils are well drained and are on stream terraces.	More than 5.	More than 20 feet.	0–15 15–54 54+
FfC FfD FaD3 FaE3 FaF3 FmD2	Fairmount flaggy silty clay loam, 6 to 12 percent slopes. Fairmount flaggy silty clay loam, 12 to 20 percent slopes. Fairmount flaggy clay, 6 to 20 percent slopes, severely eroded. Fairmount flaggy clay, 20 to 30 percent slopes, severely eroded. Fairmount flaggy clay, 30 to 60 percent slopes, severely eroded. Fairmount-rock land complex, 6 to 20 percent slopes, eroded.	Firm flaggy silty clay loam, one-half foot thick, over very firm flaggy clay 1 to 1½ feet thick; below is thin-bedded, argillaceous limestone (Richmond); the soils are somewhat excessively drained and are on hillsides.	1 to 3	More than 20 feet.	0–6 6–17 17+

See footnote at end of table.

their estimated physical properties—Continued

Classification			Percentage passing sieve—			Permeability	Available water capacity	Reaction	Shrink-swell potential
Dominant USDA texture	Unified	AASHO	No. 4	No. 10	No. 200				
						Inches per hour	*Inches per inch*	*pH value*	
Silt loam	CL	A-4 or A-6	95-100	95-100	75-95	2.5 - 5.0	0.22	4.0-4.5	Moderate.
Silty clay loam	CL	A-6	95-100	95-100	85-95	0.8 - 2.5	.19	4.0-4.5	Moderate.
Silty clay	CH	A-7	100	98-100	90-100	0.05- 0.8	.16	4.0-4.5	High.
Clay	CH	A-7	100	98-100	95-100	0.05- 0.2	.14	4.0-4.5	High.
Silt loam	ML-CL	A-4 or A-6	95-100	95-100	75-95	0.8 - 5.0	.22	4.5-6.0	Moderate.
Silty clay loam	CL	A-6	95-100	95-100	85-95	0.8 - 2.5	.19	4.0-5.5	Moderate.
Silty clay loam	CL	A-6	95-100	95-100	85-95	0.5 - 0	(1)	4.0-5.0	Moderate.
Silt loam, silty clay loam, and clay.	SC, CL, or CH.	A-2, A-6, or A-7.	90-100	85-100	30-70	0.5 - 0	.22	4.0-5.0	Moderate.
Stratified gravelly silt, sand, and clay.	GC or SC	A-1 or A-2	40-70						
Shaly silt loam	ML	A-4	85-95	80 95	65-90	2.5 - 5.0	.22	4.0-5.0	Low.
Shaly silty clay	ML or GM	A-7	45-95	40-90	50-80	0.2 - 0.8	.16	4.0-4.5	Moderate.
Bedrock									
Silt loam	ML-CL	A-4	95-100	95-100	75-95	0.8 - 5.0	.22	4.5-6.5	Low.
Silty clay loam	CL	A-6	95-100	95-100	85-95	0.8 - 2.5	.19	4.5-5.0	Moderate.
Silty clay	CH	A-7	100	98-100	90-100	0.2 - 0.8	.16	4.0-4.5	High.
Silty clay loam	CL	A-7	95-100	95-100	85-95	0.8 - 2.5	.19	6.1-7.5	High.
Silty clay	CH	A-7	100	98-100	90-100	0.2 - 0.8	.16	7.0-7.5	High.
Clay	CH	A-7	100	100	90-100	0.05- 0.2	.14	7.0-7.5	High.
Silty clay loam	CL	A-6	95-100	95-100	85-95	0.8 - 2.5	.19	6.5-7.5	Moderate.
Silty clay	CH	A-7	100	98-100	90-100	0.2 - 0.8	.16	6.5-7.5	High.
Clay	CH	A-7	100	98-100	95-100	0.05- 0.2	.14	7.0-8.0	High.
Bedrock									
Silty clay loam	CL	A-6 or A-7	95-100	95-100	85-95	0.8 - 2.5	.19	6.5-7.0	Moderate.
Silty clay	CH	A-7	100	98-100	90-100	0.2 - 0.8	.16	7.0-8.0	High.
Silt loam	ML-CL	A-4	95-100	95-100	75-95	0.8-5.0	.22	6.5-7.0	Low.
Silty clay loam	CL	A-6 or A-7	95-100	95-100	85-95	0.8-2.5	.19	5.5-6.0	Moderate.
Chert and clay loam	CL or GC	A-6 or A-7							
Flaggy silty clay loam.	CL	A-6 or A-7	85-95	85-95	65-80	0.8-2.5	.19	7.0-7.5	Moderate.
Flaggy clay	CH	A-7	85-95	85-95	65-90	0.2-0.8	.14	8.0-9.0	High.
Bedrock									

TABLE 8.—*Brief description of the soils and*

Symbol on map	Soil name	Description of soil and site	Depth to bedrock	Depth to seasonally high water table	Depth from surface
FmE2	Fairmount-rock land complex, 20 to 30 percent slopes, eroded.		*Feet*		*Inches*
FnD2	Fleming cherty silt loam, 12 to 20 percent slopes, eroded.	Silt loam or silty clay loam, ½ foot to 1 foot thick, over very firm clay 1 to 2 feet thick; the underlying material is soft clay shale (Crab Orchard); the soils are well drained and are on uplands underlain by shale.	3 to 5	More than 5 feet (Seepage spots).	0–5
FoD	Fleming cherty silty clay loam, thin solum, 12 to 25 percent slopes.				5–10
FsC2	Fleming silt loam, 6 to 12 percent slopes eroded.				10–19
FsD2	Fleming silt loam, 12 to 20 percent slopes, eroded.				19–36
					36+
Gu	Guthrie silt loam.	Silt loam, 1 to 1½ feet thick, over compact cherty silty clay loam more than 2 feet thick; the underlying material is cherty dolomitic limestone (Boyle); this soil is poorly drained and has a fragipan.	3 to 7	0 to 1 foot (Perched water table).	0–16 16–45 45+
HaC2	Hagerstown cherty silt loam, 6 to 12 percent slopes, eroded.	Silt loam, 1 foot thick, over firm silty clay loam ½ foot to 1 foot thick; the underlying material is firm silty clay to clay 2 to 3 feet thick and overlies dolomitic limestone (Boyle); the soils are well drained and are on uplands.	3 to 6	More than 20 feet.	0–12 12–20 20–52 52+
HgA	Hagerstown silt loam, 0 to 2 percent slopes.				
HgB	Hagerstown silt loam, 2 to 6 percent slopes.				
HgC2	Hagerstown silt loam, 6 to 12 percent slopes, eroded.				
HgD2	Hagerstown silt loam, 12 to 20 percent slopes, eroded.				
Hn	Huntington gravelly silt loam.	Gravelly silt loam 3 feet to more than 10 feet thick; this soil is well drained and is on first bottoms.	More than 3.	2 to 3 feet	0–48+
Hs	Huntington silt loam.	Silt loam 3 to more than 10 feet thick over limestone; this soil is well drained and is on first bottoms.	More than 5.	2 to 3 feet	0–33 33–54
Hu	Huntington stony silt loam, shallow.	Stony silt loam to silty clay loam 2 to 4 feet thick; this soil is well drained and is on first bottoms.	1½ to 3	2 to 3 feet	0–24
JeC	Jefferson gravelly silt loam, 2 to 12 percent slopes.	Gravelly silt loam, 1 to 1½ feet thick, over gravelly silty clay loam 2 to 2½ feet thick; the underlying material is local alluvium 2 to more than 6 feet thick; these soils are well drained and are on toe slopes consisting of local alluvium.	More than 5.	More than 10 feet.	0–18 18–48+
JeD	Jefferson gravelly silt loam, 12 to 20 percent slopes.				
JoA	Johnsburg and Cavode silt loams, 0 to 2 percent slopes.	Silt loam, 1 to 1½ feet thick, over silty clay loam fragipan or claypan 2 to 4 feet thick; the underlying material is soft clay shale (Waverly or Crab Orchard); the soils are somewhat poorly drained; they are on uplands.	4 to 6	0 to 2 feet (Perched water table).	0–8 8–40 40–47 47+
JoB	Johnsburg and Cavode silt loams, 2 to 6 percent slopes.				
JoC	Johnsburg and Cavode silt loams, 6 to 12 percent slopes.				
JoC2	Johnsburg and Cavode silt loams, 6 to 12 percent slopes, eroded.				
LaB	Landisburg cherty silt loam, 2 to 12 percent slopes.	Cherty silt loam, 1 to 1½ feet thick, over a cherty silt loam fragipan 1 foot thick; below is cherty silty clay loam 2 to 4 feet thick; this soil is moderately well drained to somewhat poorly drained; it is on toe slopes consisting of local alluvium.	More than 5.	1 to 3 feet (Perched water table).	0–16 16–28 28–48+

See footnote at end of table.

their estimated physical properties—Continued

Classification			Percentage passing sieve—			Permeability	Available water capacity	Reaction	Shrink-swell potential
Dominant USDA texture	Unified	AASHO	No. 4	No. 10	No. 200				
						Inches per hou	*Inches per inch*	*pH value*	
Silt loam and cherty silt loam.	ML–CL	A–4	70–90	65–80	55–75	2.5–5.0	0.22	6.0–6.5	Low.
Silty clay loam and cherty silty clay loam.	CL	A–6	70–90	65–80	55–75	0.8–2.5	.19	5.0–5.5	Moderate.
Silty clay and cherty silty clay.	CH	A–7	75–90	70–85	60–80	0.2–0.8	.16	5.0–5.5	High.
Clay and cherty clay	CH	A–7	75–90	70–85	60–80	0.05–0.2	.14	4.5–5.5	High.
Bedrock									
Silt loam	ML–CL	A–4	95–100	95–100	75–95	0.8–5.0	.22	4.5–5.5	Low.
Silty clay loam	CL	A–6 or A–7	95–100	95–100	85–95	0.05–0	(1)	4.0–5.0	Moderate.
Bedrock									
Silt loam	ML	A–4	95–100	95–100	75–95	2.5–5.0	.22	5.0–6.5	Low.
Silty clay loam	CL	A–7	95–100	95–100	85–95	0.8–2.5	.19	4.0–5.0	Moderate.
Silty clay	CH	A–7	100	98–100	90–100	0.8–2.5	.16	4.0–5.0	High.
Bedrock									
Gravelly silt loam	ML	A–4	70–85	65–75	30–60	2.5–5.0	.14	6.5–7.0	Moderate.
Silt loam	ML–CL	A–4	95–100	95–100	75–95	2.5–5.0	.22	6.0–7.5	Low.
Silt loam	CL	A–4 or A–6	95–100	95–100	75–95	2.5–5.0	.22	7.0–7.5	Moderate.
Stony silt loam	ML–CL	A–4	60–85	50–80	40–70	2.5–5.0	.22	6.5–7.0	Low.
Gravelly silt loam	ML	A–2 or A–4	70–85	65–75	30–60	2.5–5.0	.14	4.0–5.0	Low.
Gravelly silty clay loam.	ML or CL	A–4 or A–7	85–95	80–90	55–65	2.5–5.0	.11	4.0–4.5	Moderate.
Silt loam	ML–CL	A–4	95–100	95–100	75–95	2.5–5.0	.22	4.5–5.5	Low.
Silty clay loam	ML or CL	A–6 or A–7	95–100	95–100	85–95	0.05–0	(1)	4.0–5.0	Moderate.
Silty clay	CL	A–6 or A–7	100	98–100	90–100	0.05–0	(1)	4.0–5.0	High.
Bedrock									
Cherty silt loam	GM, SM, or ML.	A–4	65–80	60–75	40–60	0.8–5.0	.22	4.5–6.5	Low.
Cherty silt loam	GM, SM, or ML.	A–4 or A–6	65–80	60–75	40–60	0.05–0	(1)	4.0–5.0	Moderate.
Cherty silty clay loam.	CL	A–6 or A–7	70–85	65–80	45–65	0.05–0	(1)	4.0–5.0	Moderate.

TABLE 8.—*Brief description of the soils and*

Symbol on map	Soil name	Description of soil and site	Depth to bedrock	Depth to seasonally high water table	Depth from surface
			Feet		*Inches*
Lc	Lawrence silt loam.	Silt loam, 1 to 1½ feet thick, over silty clay loam fragipan 2 to 4 feet thick; the underlying material is dolomitic limestone (Boyle); this soil is somewhat poorly drained and is on uplands.	4 to 6	0 to 2 feet (Perched water table).	0–20 20–40
Ld	Lindside silt loam.	Silt loam, 2 feet thick, over stratified, firm silty clay loam 1 to more than 7 feet thick; the silty clay loam is underlain by limestone; this soil is moderately well drained and is on first bottoms.	More than 5.	1 to 3 feet	0–22 22–48+
LoB LoB2 LoC LoC2 LoD2 LpC3 LpD3	Lowell silt loam, 2 to 6 percent slopes. Lowell silt loam, 2 to 6 percent slopes, eroded. Lowell silt loam, 6 to 12 percent slopes. Lowell silt loam, 6 to 12 percent slopes, eroded. Lowell silt loam, 12 to 20 percent slopes, eroded. Lowell silty clay loam, 6 to 12 percent slopes, severely eroded. Lowell silty clay loam, 12 to 20 percent slopes, severely eroded.	Silt loam, 1 foot thick, over firm silty clay loam one-half foot thick; below is silty clay or clay, 1½ to 3 feet thick, underlain by thin-bedded limestone or siltstone; these soils are well drained and are on uplands.	2 to 4	More than 20 feet.	0–12 12–16 16–23 23–39 39+
LsD3 LsE3 LrB2 LrC2 LrD2 LrE2 LrF2 LvD2 LwE3	Lowell silty clay, shallow, 12 to 20 percent slopes, severely eroded. Lowell silty clay, shallow, 20 to 30 percent slopes, severely eroded. Lowell silty clay loam, shallow, 2 to 6 percent slopes, eroded. Lowell silty clay loam, shallow, 6 to 12 percent slopes, eroded. Lowell silty clay loam, shallow, 12 to 20 percent slopes, eroded. Lowell silty clay loam, shallow, 20 to 30 percent slopes, eroded. Lowell silty clay loam, shallow, 30 to 50 percent slopes, eroded. Lowell very rocky silty clay loam, 6 to 20 percent slopes, eroded. Lowell very rocky silty clay, 20 to 30 percent slopes, severely eroded.	Firm fine silt loam, one-half foot thick, over firm silty clay 1 foot thick; below is very firm clay 1 to 2 feet thick that overlies argillaceous limestone or siltstone; these soils are well drained and are on uplands; the very rocky mapping units are shallow to bedrock and have much limestone bedrock at the surface.	2 to 3	More than 20 feet.	0–5 5–15 15–31 31+
Me	Melvin silt loam.	Silt loam, one-half foot thick, over firm silty clay loam that is 2½ feet thick; the underlying material is stratified silt, clay, and gravel; this soil is poorly drained and is on first bottoms.	More than 5.	At the surface	0–6 6–35+
MfB MfC MfC2	Monongahela fine sandy loam, 2 to 6 percent slopes. Monongahela fine sandy loam, 6 to 12 percent slopes. Monogahela fine sandy loam, 6 to 12 percent slopes, eroded.	Fine sandy loam, 1 foot thick, over friable fine sandy clay loam 1 foot thick; below is a compact clay loam fragipan 1 to 3 feet thick; overlies stratified sand and gravel 2 to more than 10 feet thick; the soils are moderately well drained and are on stream terraces.	More than 5.	1 to 2 feet (Perched water table).	0–14 14–24 24–48+
MgA MgB MgC MgC2	Monongahela silt loam, 0 to 2 percent slopes. Monongahela silt loam, 2 to 6 percent slopes. Monongahela silt loam, 6 to 12 percent slopes. Monongahela silt loam, 6 to 12 percent slopes, eroded.	Silt loam, 1 foot thick over silty clay loam 1 foot thick; below is a compact silty clay loam fragipan, 1 to 3 feet thick, that overlies stratified sand, silt, clay, and gravel that is 2 to more than 10 feet thick; the soils are moderately well drained; they are on stream terraces.	More than 5.	1 to 2 feet (Perched water table).	0–13 13–24 24–36

See footnote at end of table.

their estimated physical properties—Continued

Classification			Percentage passing sieve—			Permeability	Available water capacity	Reaction	Shrink-swell potential
Dominant USDA texture	Unified	AASHO	No. 4	No. 10	No. 200				
						Inches per hour	*Inches per inch*	*pH value*	
Silt loam	ML–CL	A–4	95–100	95–100	75–95	0. 8 – 5. 0	0. 22	5. 0–6. 0	Low.
Silty clay loam	CL	A–6	95–100	95–100	85–95	0. 05– 0	(1)	4. 0–4. 5	Moderate.
Silt loam	ML–CL	A–4	95–100	95–100	75–95	0. 8 – 5. 0	. 22	6. 5–7. 0	Low.
Silty clay loam	CL	A–6	95–100	95–100	85–95	0. 8 – 2. 5	. 19	7. 0–7. 5	Moderate.
Silt loam	ML–CL	A–4 or A–6	95–100	95–100	75–95	2. 5 – 5. 0	. 22	5. 0–6. 0	Moderate.
Silty clay loam	CL	A–6	95–100	95–100	85–95	0. 8 – 2. 5	. 19	5. 0–5. 5	Moderate.
Silty clay	CH	A–7	100	98–100	90 100	0. 2 – 0. 8	. 16	5. 0–5. 5	High.
Clay	CH	A–7	100	98–100	95–100	0. 2 – 0. 8	. 14	4. 5–5. 5	High.
Bedrock									
Silt loam	ML or CL	A–4 or A–6	95–100	95–100	75–95	0. 8 –2. 5	. 22	6. 0–7. 0	Moderate.
Silty clay	CH	A–7	100	98-100	90–100	0. 2 –0. 8	. 16	5. 0–5. 5	High.
Clay	CH	A–7	100	98–100	95–100	0. 05– 0. 8	. 14	5. 5–7. 5	High.
Bedrock									
Silt loam	CL	A–4	95–100	95–100	75–95	2. 5– 5. 0	. 22	7. 0–7. 5	Moderate.
Silty clay loam	CL	A–6	95–100	95–100	85–95	0. 8– 2. 5	. 19	7. 0 7. 5	Moderate.
Fine sandy loam	SM or ML	A -4	95–100	90–100	40–60	5. 0–10. 0	. 13	4. 0–5. 5	Low.
Sandy clay loam	ML or CL	A–6	95–100	90–100	60–80	2. 5– 5. 0	. 17	4. 0–5. 0	Moderate.
Clay loam	CL	A–6	95–100	95–100	70–85	0. 05– 0	(1)	4. 0–5. 0	Moderate.
Silt loam	ML	A–4	95–100	95–100	75–95	0. 8– 5. 0	. 22	5. 0–6. 0	Low.
Silty clay loam	CL	A–6	95–100	95–100	85–95	0. 8– 2. 5	. 19	4. 0–5. 0	Moderate.
Silty clay loam	CL	A–6	95–100	95–100	85–95	0. 05– 0	(1)	4. 0 5. 0	Moderate.

TABLE 8.—*Brief description of the soils and*

Symbol on map	Soil name	Description of soil and site	Depth to bedrock	Depth to seasonally high water table	Depth from surface
			Feet		*Inches*
Mm	Mullins silt loam.	Silt loam, 1 to 1½ feet thick, over a silt loam fragipan 3 to 5 feet thick; the underlying material is soft clay shale (Waverly or Crab Orchard); this soil is poorly drained and is on uplands.	6 to 8	0 to 1 foot (Perched water table).	0–15 15–48+
MnC MnD MsC2 MsD2	Muse silt loam, 6 to 12 percent slopes. Muse silt loam, 12 to 20 percent slopes. Muse silty clay loam, 6 to 12 percent slopes, eroded. Muse silty clay loam, 12 to 20 percent slopes, eroded.	Silt loam, one-half foot thick, over firm silty clay loam 2 feet thick; below is very firm silty clay 1 to 2 feet thick over weathered, acid clay shale and clay 3 to more than 10 feet thick; the soils are well drained; they are on toe slopes consisting of local alluvium.	More than 5.	More than 10 feet.	0–6 6–30 30–42+
MuD MuE MuF MuG	Muskingum stony silt loam, 6 to 20 percent slopes. Muskingum stony silt loam, 20 to 30 percent slopes. Muskingum stony silt loam, 30 to 50 percent slopes. Muskingum stony silt loam, 50 to 80 percent slopes.	Stony silt loam, one-half foot thick, over friable gravelly silt loam ½ foot to 1 foot thick; below is friable gravelly silty clay loam ½ foot to 1 foot thick; the gravelly silty clay loam overlies siltstone, sandstone, or shale; or a mixture of these three; the soils are somewhat excessively drained and are on hillsides.	1 to 3	More than 20 feet.	0–7 7–13 13–19 19+
Ne	Newark silt loam.	Silt loam, ½ foot to 1 foot thick, over firm silty clay loam 2 to more than 10 feet thick; the silty clay loam is underlain by limestone; this soil is somewhat poorly drained and is on first bottoms.	More than 5	0 to 1 foot	0–8 8–50+
NkB	Nicholson silt loam, 0 to 6 percent slopes.	Friable silt loam, 1 to 1½ feet thick, over firm silty clay loam 1 foot thick; below is a silty clay loam fragipan 1 to 2 feet thick over firm silty clay 1 to 4 feet thick; the silty clay overlies interbedded siltstone and limestone (Garrard); this soil is well drained to moderately well drained; it is on uplands.	4 to 6	2 to more than 5 feet.	0–16 16–32 32–44 44–50+
OtC OtC2 OtD2 OtE2 OtF2	Otway silty clay, 6 to 12 percent slopes. Otway silty clay, 6 to 12 percent slopes, eroded. Otway silty clay, 12 to 20 percent slopes, eroded. Otway silty clay, 20 to 30 percent slopes, eroded. Otway silty clay, 30 to 50 percent slopes, eroded.	Silty clay, ½ foot thick, over firm silty clay 1 foot thick; below is very firm, calcareous clay 1 to 3 feet thick that overlies calcareous clay shale interbedded with thin, sandy lenses of dolomite (Whitewater); the soils are somewhat excessively drained and are on uplands.	2 to 5	More than 20 feet.	0–5 5–18 18–40 40+
Ph	Philo silt loam.	Silt loam 3 to more than 10 feet thick; this soil is moderately well drained and is on first bottoms.	More than 5	2 to more than 3 feet.	0–8 8–48+
Pm	Pope fine sandy loam.	Fine sandy loam 3 to more than 10 feet thick; this soil is well drained and is on first bottoms.	More than 5.	2 to more than 3 feet.	0–40 40+
Pn	Pope gravelly silt loam.	Gravelly silt loam 3 to more than 6 feet thick; this soil is well drained and is on first bottoms.	More than 5.	2 to more than 3 feet.	0–9 9–40
Po	Pope silt loam.	Silt loam 3 to more than 10 feet thick; this soil is well drained and is on first bottoms.	More than 5.	2 to more than 3 feet.	0–40 40+

See footnote at end of table.

their estimated physical properties—Continued

Classification			Percentage passing sieve—			Permeability	Available water capacity	Reaction	Shrink-swel potential
Dominant USDA texture	Unified	AASHO	No. 4	No. 10	No. 200				
						Inches per hour	*Inches per inch*	*pH value*	
Silt loam	ML–CL	A–4	95–100	95–100	75–95	0. 8– 5. 0	0. 22	4. 0–5. 0	Low.
Silt loam	CL	A–4 or A–6	95–100	95–100	75–95	0. 05– 0	(1)	4. 0–5. 0	Moderate.
Silt loam	ML–CL	A–4	95–100	95–100	75–95	2. 5– 5. 0	. 22	4. 0–5. 0	Low.
Silty clay loam	CL	A–6	95–100	95–100	85–95	0. 8– 2. 5	. 19	4. 0–4. 5	Moderate.
Silty clay	CH	A–7	100	98–100	95–100	0. 2– 0. 8	. 16	4. 0–4. 5	High.
Stony silt loam	ML	A–4	75–90	70–80	60–85	5. 0 –10. 0	. 22	4. 0–5. 0	Low.
Gravelly silt loam	GM, SM, or ML.	A–4	70–85	65–75	40–60	5. 0 –10. 0	. 14	4. 0–4. 5	Low.
Gravelly silty clay loam.	CL or ML	A–6	85–95	80–90	55–65	5. 0 –10. 0	. 11	4. 0–4. 5	Moderate.
Bedrock									
Silt loam	CL	A–4 or A–6	95–100	95–100	75–95	2. 5 – 5. 0	. 22	6. 0–7. 0	Moderate.
Silty clay loam	CL	A–6	95–100	95–100	85–95	0. 8 – 2. 5	. 19	6. 5–7. 0	Moderate.
Silt loam	ML–CL	A–4	95–100	95–100	75–95	2. 5 – 5. 0	. 22	7. 0–7. 5	Low.
Silty clay loam	CL	A–6	95–100	95–100	85–95	0. 8 – 2. 5	. 19	7. 0–7. 5	Moderate.
Silty clay loam	CL	A–6	95–100	95–100	85–95	0. 05–0	(1)	7. 0–7. 5	Moderate.
Silty clay	CH	A–7	100	98–100	90–100	0. 05–0		5. 0–6. 0	High.
Silty clay	CL–CH	A–6 or A–7	95–100	95–100	85–95	0. 8 – 2. 5	. 19	7. 0–7. 5	Moderate to high.
Silty clay	CH	A–7	100	98–100	90–100	0. 2 – 0. 8	. 16	7. 5–8. 0	High.
Clay	CH	A–7	100	98–100	95–100	0. 2 – 0. 8	. 14	8. 0–9. 0	High.
Bedrock									
Silt loam	ML–CL	A–4	95–100	95–100	75–95	2. 5 – 5. 0	. 22	5. 5–6. 0	Low.
Silt loam	ML–CL	A4	95–100	95–100	75–95	2. 5 – 5. 0	. 22	4. 0–6. 0	Moderate.
Fine sandy loam	SM or ML	A–4	95–100	90–100	40–60	2. 5 –10. 0	. 13	4. 0–5. 5	Low.
Stratified sandy material with some sandstone and shale fragments.	SM	A–2	90–100	85–95	30–55	2. 5 –10. 0	. 10	4. 0–5. 5	Low.
Gravelly silt loam	GM, SM, or ML.	A–4	60–80	50–80	35–55	2. 5 –10. 0	. 13	4. 0–5. 5	Low.
Gravelly loam	GM, SM, or ML.	A–4 or A–6	60–80	50–80	35–55	2–5 –10. 0	. 13	4. 0–5. 5	Low.
Silt loam	ML	A–4	95–100	95–100	75–95	2. 5 – 5. 0	. 22	5. 5–6. 0	Low.
Stratified silt and sand with some sandstone and shale fragments.	SM	A–4	90–100	85–95	60–80	2. 5 – 5. 0	. 13	4. 0–5. 5	Low.

TABLE 8.—*Brief description of the soils and*

Symbol on map	Soil name	Description of soil and site	Depth to bedrock	Depth to seasonally high water table	Depth from surface
			Feet		*Inches*
Pr	Purdy silt loam.	Silt loam, 1 to 1½ feet thick, over compact silt loam fragipan 2 to 3 feet thick; below is stratified sand, silt, clay, and gravel 2 to more than 5 feet thick; this soil is poorly drained; it is on stream terraces.	More than 5.	At the surface (Perched water table).	0–15 15–48+
RaB RaC RaD RcC2 RcD2	Rarden silt loam, 2 to 6 percent slopes. Rarden silt loam, 6 to 12 percent slopes. Rarden silt loam, 12 to 20 percent slopes. Rarden silty clay loam, 6 to 12 percent slopes, eroded. Rarden silty clay loam, 12 to 20 percent slopes, eroded.	Silt loam, one-half foot thick, over firm silty clay loam one-fourth foot thick; below is firm silty clay 1 foot thick over very firm clay also 1 foot thick; the underlying material is soft clay shale (Waverly or Crab Orchard); the soils are well drained to moderately well drained and are on uplands.	2 to 4	More than 5 feet (Seepage spots).	0–7 7–10 10–21 21–30 30+
Re	Robertsville silt loam.	Silt loam, 1½ feet thick, over a silty clay loam fragipan 2 to 4 feet thick; the underlying material is stratified gravel, sand, silt, and clay 3 to 15 feet thick; this soil is poorly drained and is on stream terraces.	More than 5.	At the surface (Perched water table).	0–18 18–46+
RkD RkE RkF RsD2 RsE2	Rockcastle silt loam, 12 to 20 percent slopes. Rockcastle silt loam, 20 to 30 percent slopes. Rockcastle silt loam, 30 to 50 percent slopes. Rockcastle silty clay, 12 to 20 percent slopes, eroded. Rockcastle silty clay, 20 to 30 percent slopes, eroded.	Silt loam, one-half foot thick, over firm silty clay one-half foot thick; below is firm clay, 1 foot thick, underlain by soft shale (Waverly or Crab Orchard); the soils are somewhat excessively drained and are on uplands.	1 to 3	More than 5 feet.	0–6 6–13 13–25 25+
SaB SaC	Sees silty clay loam, 2 to 6 percent slopes. Sees silty clay loam, 6 to 12 percent slopes.	Silty clay loam, one-half foot thick, over very silty clay 2 to more than 5 feet thick; the soils are moderately well drained to somewhat poorly drained and are on toe slopes; consisting of local alluvium.	More than 5.	1 to 2 feet (Perched water table).	0–6 6–48+
ScA	Sequatchie silty clay loam, heavy variant, 0 to 4 percent slopes.	Silty clay loam, one-half foot thick, over firm to very firm silty clay 2 to more than 10 feet thick; this soil is well drained and is on low stream terraces.	More than 5.	More than 10 feet.	0–8 8–47+
SeB SeC SeC2	Shelbyville silt loam, 2 to 6 percent slopes. Shelbyville silt loam, 6 to 12 percent slopes. Shelbyville silt loam, 6 to 12 percent slopes, eroded.	Silt loam, 1 foot thick, over friable to firm silty clay loam 1½ feet thick; below is firm silty clay or clay 1½ feet thick; the clay is underlain by interbedded siltstone and limestone (Garrard); the soils are well drained and are on uplands.	3 to 6	More than 20 feet.	0–10 10–28 28–33 33–46 46+
SsD ShD2 ShE2	Shrouts silty clay loam, 6 to 20 percent slopes. Shrouts clay, 6 to 20 percent slopes, eroded. Shrouts clay, 20 to 30 percent slopes, eroded.	Silty clay loam, one-half foot thick, over silty clay to clay 1½ feet thick; below is soft, weakly calcareous, clayey shale; these soils have somewhat rapid runoff and slow permeability.	2	More than 20 feet.	0–5 5–24 24+
St	Stendal silt loam.	Silt loam 3 to more than 10 feet thick; this soil is somewhat poorly drained and is on first bottoms.	More than 5.	0 to 1 foot	0–16 16–44+
Ta	Taft silt loam.	Silt loam, 1½ feet thick, over a compact silty clay loam fragipan 2 to 4 feet thick; the underlying material is stratified gravel, sand, silt, and clay; this soil is somewhat poorly drained; it is on stream terraces.	More than 5.	0 to 2 feet (Perched water table).	0–19 19–47

See footnote at end of table.

their estimated physical properties—Continued

Classification			Percentage passing sieve—			Permeability	Available water capacity	Reaction	Shrink-swell potential
Dominant USDA texture	Unified	AASHO	No. 4	No. 10	No. 200				
						Inches per hour	*Inches per inch*	*pH value*	
Silt loam	ML–CL	A–4	95–100	95–100	75–95	0. 8 – 2. 5	0. 22	4. 0–5. 0	Low.
Silt loam	CL	A–4 or A–6	95–100	95–100	75–95	0. 05– 0	(1)	4. 0–4. 5	Moderate.
Silt loam	ML or CL	A–4 or A–6	95–100	95–100	75–95	0. 8 – 2. 5	. 22	4. 0–5. 5	Moderate.
Silty clay loam	CL	A–6	95–100	95–100	85–95	0. 2 – 0. 8	. 19	4. 0–5. 5	Moderate.
Silty clay	ML–CL	A–7	100	98–100	90–100	0. 2 – 0. 8	. 16	4. 0–5. 5	High.
Clay	ML–CL	A–7	100	98–100	95–100	0. 05– 0. 02	. 14	4. 0–5. 5	High.
Bedrock									
Silt loam	ML–CL	A–4	95–100	95–100	75–95	0. 8 – 5. 0	. 22	6. 0–7. 0	Low.
Silty clay loam	CL	A–6	95–100	95–100	85–95	0. 05– 0	(1)	4. 5–6. 0	Moderate.
Silt loam	CL	A–4 or A–6	95–100	95–100	75–95	0. 8 – 2. 5	. 22	4. 0–5. 5	Moderate.
Silty clay	CH	A–7	100	98–100	90–100	0. 2 – 0. 8	. 16	4. 0–5. 5	High.
Clay	CH	A–7	100	98–100	95–100	0. 05– 0. 02	. 14	4. 0–5. 5	High.
Bedrock									
Silty clay loam	CL	A–6	95–100	95–100	85–95	0. 8 – 2. 5	. 19	6. 0–6. 5	Moderate.
Silty clay	CH	A–7	100	98–100	90–100	0. 2 – 0. 8	. 16	7. 0–7. 5	High.
Silty clay loam	CL	A–6	95–100	95–100	85–95	0. 8 – 2. 5	. 19	4. 0–5. 0	Moderate.
Silty clay	CH	A–7	100	98–100	90–100	0. 2 – 2. 5	. 16	4. 0–4. 5	High.
Silt loam	ML–CL	A–4 or A–6	95–100	95–100	75–95	2. 5 – 5. 0	. 22	6. 0–6. 5	Low.
Silty clay loam	CL	A–6	95–100	95–100	85–95	0. 8 – 2. 5	. 19	6. 0–6. 5	Moderate.
Silty clay	CH	A–7	100	98–100	90–100	0. 2 – 2. 5	. 16	6. 0–6. 5	High.
Clay	CH	A–7	100	98–100	95–100	0. 05– 2. 5	. 14	6. 0–6. 5	High.
Bedrock									
Silty clay loam	CL	A–6	95–100	95–100	85–95	0. 8 – 2. 5	. 19	6. 5–7. 5	Moderate.
Clay	CH	A–7	100	98–100	95–100	0. 05– 0. 8	. 14	7. 0–8. 0	High.
Bedrock									
Silt loam	ML	A–4	95–100	95–100	75–95	2. 5 – 5. 0	. 22	4. 5–5. 0	Low.
Silt loam	CL	A–4 or A–6	95–100	95–100	75–95	0. 8 – 2. 5	. 22	4. 0–5. 0	Moderate.
Silt loam	ML–CL	A–4	95–100	95–100	75–95	0. 8 – 5. 0	. 22	4. 5–5. 5	Low.
Silty clay loam	CL	A–7	95–100	95–100	85–95	0. 05 - 0	(1)	4. 5–5. 0	Moderate.

TABLE 8.—*Brief description of the soils and*

Symbol on map	Soil name	Description of soil and site	Depth to bedrock	Depth to seasonally high water table	Depth from surface
			Feet		*Inches*
TsB TsC	Tilsit silt loam, 2 to 6 percent slopes. Tilsit silt loam, 6 to 12 percent slopes.	Silt loam, 1½ to 2 feet thick, over a compact silty clay loam fragipan 2 to 3 feet thick; the underlying material is interbedded siltstone and shale (Waverly); the soils are moderately well drained; they are on uplands.	3 to 5	1 to 2 feet (Perched water table).	0–22 22–46
TtB TtC2 TtD2	Trappist silt loam, 2 to 6 percent slopes. Trappist silt loam, 6 to 12 percent slopes, eroded. Trappist silt loam, 12 to 20 percent slopes, eroded.	Silt loam, 1 foot thick, over firm silty clay loam 1½ feet thick; below is firm silty clay, one-half foot thick, underlain by brittle black fissile shale (Ohio); the soils are well drained and are on uplands.	2 to 5	More than 20 feet.	0–14 14–31 31–35 35+
Tv	Tyler fine sandy loam.	Fine sandy loam, one-half foot thick, over friable fine sandy clay loam one-half foot thick; below is a fine sandy clay loam fragipan 2 to 4 feet thick and is underlain by stratified sand, gravel, and clay; this soil is somewhat poorly drained; it is on stream terraces.	More than 5.	0 to 1 foot (Perched water table).	0–7 7–14 14–39
Ty	Tyler silt loam.	Silt loam, 1½ feet thick, over silt loam 1½ to 3 feet thick; below is stratified gravel, fine sand, silt, and clay 4 to more than 10 feet thick; this soil is somewhat poorly drained and is on stream terraces.	More than 5.	0 to 1 foot (Perched water table).	0–16 16–36 36–48+
Wh	Whitwell silt loam.	Silt loam, ½ foot to 1 foot thick, over firm silty clay loam 3 feet thick; below is firm silty clay 2 to 10 feet thick; this soil is moderately well drained and is on low terraces.	More than 5.	2 to 3 feet	0–9 9–44 44–50
WoB WoC WoD2	Woolper silty clay loam 2 to 6 percent slopes. Woolper silty clay loam 6 to 12 percent slopes. Woolper silty clay loam 12 to 20 percent slopes, eroded.	Silty clay loam, 1 foot thick, over very firm silty clay 2½ feet thick; below is very firm clay 1 to more than 3 feet thick; the soils are well drained and are on toe slopes or alluvial fans.	3 to more than 6.	More than 10 feet.	0–12 12–42 42–46+

[1] Fragipan.

Engineering interpretations

Table 9 rates the soils according to their suitability for use in the construction of highways. It also indicates properties that will adversely affect the use of the soils for highway work and for agricultural engineering practices. The data are based on information given in table 8, on actual test data, and on field experience. Additional information about the topography of the county, the association of specific soils with other soils, and the underlying rock strata can be found in the sections "General Soil Map" and "Physiography, Geology, Relief, and Drainage."

The column that shows the suitability of the soil material for topsoil and road fill and also as a source of sand and gravel gives ratings for the soil material. The ratings do not include the underlying rock. Other than for a few deposits near the Licking River, little of the soil material in the county is suitable as a source of sand and gravel.

The suitability of the soil material for road fill depends largely on the texture of the material and on its natural content of water. Highly plastic soil material that is naturally high in water content is rated *poor*. Highly erodible soils (silts and fine sands) are difficult to compact, and they require a moderately gentle slope and a fast-growing cover of vegetation; therefore, they are rated as *poor to fair*. The erodibility of the soil and its effect on cuts and fills is also indicated in the column "Susceptibility to—Erosion of cuts and fills."

The suitability of the soil material for winter grading depends largely on the texture of the soil material, its natural content of water, and the depth to the water table during this period of the year. Clay soils are difficult to handle when wet, and they must be dried to the proper moisture content for compaction; therefore, they are rated as not suitable.

The topography of an area, as well as the soils in that area, influence the location of highways. In considering the suitability of a site for the location of a highway, only the soils were considered. Where rock is present that will affect the location of the gradeline, the engineer must determine how difficult the rock will be to excavate, whether slides are likely to occur in the rock strata, and whether water is likely to seep along or through the bedrock.

their estimated physical properties—Continued

Classification			Percentage passing sieve—			Permeability	Available water capacity	Reaction	Shrink-swell potential
Dominant USDA texture	Unified	AASHO	No. 4	No. 10	No. 200				
						Inches per hour	*Inches per inch*	*pH value*	
Silt loam	ML	A-4	95–100	95–100	75–95	0. 8 – 2. 5	0. 22	4. 0–6. 0	Low.
Silty clay loam	CL	A-6	95–100	95–100	85–95	0. 05– 0	(1)	4. 0–5. 0	Moderate.
Silt loam	ML–CL	A–4	95–100	95–100	75–95	0. 8 – 5. 0	. 22	4. 5–5. 5	Low.
Silty clay loam	CL	A-6	95–100	95–100	85–95	0. 8 – 2. 5	. 19	4. 0–5. 0	Moderate.
Silty clay	CH	A-7	98–100	98–100	90–100	0. 2 – 0. 8	. 16	4. 0–4. 5	High.
Bedrock									
Fine sandy loam	SM or ML	A–4	95–100	90–100	40–60	2. 5 –10. 0	. 13	4. 0–5. 0	Low.
Fine sandy clay loam	ML or CL	A–4 or A 6	95–100	90–100	60–80	2. 5 – 5. 0	. 17	4. 0–5. 0	Low to moderate.
Sandy clay loam	ML or CL	A–4 or A–6	95–100	90–100	60–80	0. 05– 0	(1)	4. 0–4. 5	Low to moderate.
Silt loam	ML–CL	A -4	95–100	95–100	75–95	0. 8 – 5. 0	. 22	4. 0–5. 5	Low.
Silt loam	CL	A–4 or A–6	95–100	95–100	75–95	0. 05– 0	(1)	4. 0 4. 5	Moderate.
Silty clay loam	CL	A–6	95–100	95–100	85–95	0. 05– 0	. 19	4. 0–4. 5	Moderate.
Silt loam	CL	A–4 or A–6	95–100	95–100	75–95	2. 5 – 5. 0	. 22	4. 0–5. 0	Moderate.
Silty clay loam	CL	A–6	95–100	95–100	85–95	0. 8 – 2. 5	. 19	4. 0–4. 5	Moderate.
Silty clay	CH	A–7	100	98–100	90–100	0. 2 – 2. 5	. 16	4. 0–4. 5	High.
Silty clay loam	CL	A–6	95–100	95–100	85–95	0. 8 – 2. 5	. 19	7. 0–7. 5	Moderate.
Silty clay	CH	A–7	100	98–100	90 100	0. 2 – 0. 8	. 16	7. 0–7. 5	High.
Clay	CH	A–7	100	98–100	95–100	0 05– 0. 2	. 14	7. 0–7. 5	High.

The location of the gradeline is also affected by poor drainage. In table 9, grades at a higher elevation than the surrounding areas are suggested to provide adequate drainage on wet soils. They also keep the roadway above the area reached by a high water table or by occasional floods. Where there is subsurface seepage, interceptor ditches or underdrains may be needed. Slumping or sliding of the overlying material may be caused by seepage in back slopes or cuts.

The rating of the soil as to its susceptibility to frost action depends on the texture of the soil material, the depth to the water table during the freezing period, and the length of time that the temperature is below freezing. Silts and fine sands that have a high water table are rated as *high* in susceptibility to frost action.

Earthwork is difficult during the winter on most of the soils in Bath County. Nevertheless, it is possible to excavate, haul, and compact the better drained, coarse-textured soil material during the winter. The fine-textured soil material—silts and clays—may absorb so much water during wet periods that it is difficult to dry to the moisture content most favorable for proper compaction.

In most of the mountainous part of the county and in the area where knobs are common, the soils are suitable for farm ponds. Many ponds in the Bluegrass area, however, fail because the soils are underlain by strata of cavernous rock. The danger of underground seepage can be predicted fairly accurately if the name of the soil in a specific area is known.

If outlets are available, tile can be used to drain the soils of first bottoms. As a rule, tile drainage is not feasible for the wet soils of terraces or uplands, because such soils generally have a fragipan.

Table 9 gives limitations that affect irrigation, but a guide for using sprinkler irrigation should be consulted if an irrigation project is planned. Such a guide can be obtained from the county agent or from a representative of the Soil Conservation Service.

Shallow soil, fine texture, and the presence of stones or rocks are limiting factors that affect the suitability of a soil for terraces and diversions. If the soils have one or more of these limiting factors, terraces and diversions are less successful than if the limitations are absent. Also, the terraces and diversions are more difficult to construct.

TABLE 9.—*Estimated suitability of the soils for use in construction,*

Soil series and map symbols	Suitability of soil material for—				Recommended location of gradeline with respect to ground surface
	Topsoil [1]	Road fill	Source of sand and gravel	Winter grading [2]	
Allegheny (AgB, AgC, AgC2, AgD, AgD2).	Good	Fair	Poor; thick overburden.	Limited	Bedrock is at a depth of 5 feet or more; seepage in cuts at times.[5]
Ashton (AsB, AsC, AsD)	Good	Fair	Not suitable	Limited	Bedrock is at a depth of 5 feet or more.
Atkins silt loam (At)	Good	Fair	Not suitable	Not suitable	At least 2 to 4 feet above the highest point reached by high water.
Atkins silty clay loam (Ay)	Fair	Poor	Not suitable	Not suitable	At least 2 to 4 feet above the highest point reached by high water.
Beasley (BaB, BcB2, BcC2, BcD2, BcE2, BeD3).	Good	Fair	Not suitable	Not suitable	Bedrock is at a depth of 4 feet or more.
Bedford (BfA, BfB)	Good	Fair	Not suitable	Not suitable	Limestone is at a depth of 3 feet or more.[5]
Blago (BoB)	Good	Poor	Not suitable	Not suitable	At least 4 feet above the highest point reached by the water table.
Captina (CaA, CaB, CaC2)	Good	Fair	Not suitable	Not suitable	Bedrock is at a depth of 5 feet or more; seepage in cuts at times.[5]
Colyer (CoD, CoE, CoF, CoG, CsE2).	Fair	Poor to fair; erodible.	Not suitable	Limited	Bedrock is at a depth of 1 to 3 feet.
Cruze (CzB)	Good	Poor below a depth of 3 feet.	Not suitable	Not suitable	Shale is at a depth of 5 feet or more.
Dunning (Du)	Fair	Poor	Not suitable	Not suitable	At least 2 to 4 feet above the highest point reached by high water.
Eden (EdD2, EdE2, EdF2)	Poor	Poor	Not suitable	Not suitable	Interbedded limestone and shale; bedrock is at a depth of 2 to 4 feet.
Egam (Eg)	Fair	Poor	Not suitable	Not suitable	At least 2 to 4 feet above the highest point reached by high water.
Elk (EkB, EkC2, EkD2)	Good	Fair	Not suitable	Limited	Anywhere
Fairmount (FaD3, FaE3, FaF3, FfC, FfD).	Poor	Poor	Not suitable	Not suitable	Limestone is at a depth of 1 to 3 feet.
Fairmount-rock land complex (FmD2, FmE2).	Poor	Poor	Not suitable	Not suitable	Limestone is at or near the surface.
Fleming (FnD2, FoD, FsC2, FsD2).	Poor	Poor	Poor	Not suitable	Shale is at a depth of 3 to 5 feet; seepage in cuts during wet periods.
Guthrie (Gu)	Good	Poor	Not suitable	Not suitable	At least 2 feet above the surface of the ground.
Hagerstown (HaC2, HgA, HgB, HgC2, HgD2).	Good	Fair	Not suitable	Not suitable	Limestone is at a depth of 3 to 6 feet.

See footnotes at end of table.

and selected characteristics that affect engineering practices

Characteristics that affect engineering practices					
Susceptibility to—		Farm ponds [3]	Agricultural drainage	Irrigation [4]	Terraces and diversions
Frost action	Erosion of cuts and fills				
High	Moderate	Underlying material is variable and may need blanket lining.	Not needed	None	Special care needed in outlet.
Moderate to high.	Slight	Slight seepage; suitable for pit ponds.	Not needed	None	In most areas outlet must be constructed.
Moderate to high.	Slight	Some seepage; not suitable for core material.	Drainage needed; tile and open drains suggested.	None	None.
Moderate	Slight	Slight seepage; not suitable for core material.	Drainage needed; overflow hazard; few suitable outlets for drainage water.	None	None.
Moderate	Moderate	Slight seepage in sandy pockets; hard to dig in dry weather.	Not needed	Low rate of infiltration.	Irregular slopes; in places marl will be exposed; slow infiltration.
Moderate to high.	Slight	Slight seepage; may require blanket lining.	Not needed in most areas.	None	Care needed to prevent ponding in the channels.
Moderate	Slight	Slight seepage; not suitable for core material.	Drainage needed; needs careful evaluation of compact layers before tiling.	Plastic subsoil	Plastic subsoil.
Moderate to high.	Slight	Underlying material is variable; may need blanket lining.	Not needed in most places.	None	Care needed to prevent ponding in the channels.
Moderate to high.	Severe	Some seepage; seal blanket required in places; black fissile shale near the surface.	Not needed	Shallow to black shale	Shale close to the surface; slips may occur above channel.
Moderate	Slight	Slight seepage; suitable for pit ponds.	Not needed in most places.	None	Generally not needed.
Moderate to high.	Moderate	Slight seepage; not suitable for core material.	Drainage needed; tile and open drainage suggested.	None	None.
Moderate	Moderate	Some seepage; difficult to core in narrow draws; shallow to bedrock.	Not needed	Low moisture-holding capacity.	Irregular slopes; shallow to bedrock in places; outlet highly erodible.
Moderate	Moderate	Slight seepage; not suitable for core material.	Not needed in most areas; where needed, tile and open drainage are suggested.	None	None.
Moderate to high.	Slight	Underlying material is variable; may need blanket lining.	Not needed	None	Irregular slopes.
Moderate	Moderate	Excessive seepage; requires blanket lining; bedrock near surface in places.	Not needed	Shallow to bedrock; low moisture-holding capacity.	Rocks near surface in places; difficult to establish grass in the channels.
Moderate	Moderate	Excessive seepage; requires blanket lining; many rock outcrops.	Not needed	Shallow; many rock outcrops; low moisture-holding capacity.	Many rock outcrops; difficult to establish grass in the channels.
Moderate	Slight	Slight seepage; may require blanket lining.	Not needed	None	Slow rate of infiltration, and difficult to establsih grass in the channels.
Moderate to high	Slight	May have seepage and may require blanket lining.	Drainage needed; needs careful evaluation of compact layers before tiling.	Shallow to compact layer.	Not needed.
Moderate	Moderate	Slight seepage; may require blanket lining.	Not needed	None	May have cherty spots.

TABLE 9.—*Estimated suitability of the soils for use in construction,*

Soil series and map symbols	Suitability of soil material for— Topsoil [1]	Road fill	Source of sand and gravel	Winter grading [2]	Recommended location of gradeline with respect to ground surface
Huntington gravelly silt loam (Hn).	Poor	Good	Poor to fair; high water table and excess fines.	Limited	At least 2 to 4 feet above the highest point reached by high water.
Huntington silt loam (Hs)	Good	Fair	Not suitable	Not suitable	At least 2 to 4 feet above the highest point reached by high water.
Huntington stony silt loam, shallow (Hu)	Good	Fair	Not suitable	Limited	At least 2 to 4 feet above the highest point reached by high water.
Jefferson (JeC, JeD)	Fair	Fair	Poor, excess fines	Limited	Bedrock is at a depth of 5 feet or more.
Johnsburg and Cavode (JoA, JoB, JoC, JoC2)	Good	Fair	Not suitable	Not suitable	Sandstone and shale at a depth of 4 to 6 feet; seepage in cuts at times.[5]
Landisburg (LaB)	Poor	Fair to good	Poor; excess fines	Not suitable	Bedrock is at a depth of 5 feet or more; seepage in cuts at times.[5]
Lawrence (Lc)	Good	Fair	Not suitable	Not suitable	Limestone at a depth of 4 to 6 feet; seepage in cuts common.[5]
Lindside (Ld)	Good	Fair	Not suitable	Not suitable	At least 2 to 4 feet above the highest point reached by high water.
Lowell (LoB, LoB2, LoC, LoC2, LoD2, LpC3, LpD3).	Excellent	Fair to poor	Not suitable	Not suitable	Limestone is at a depth of 2 to 4 feet.
Lowell (LsD3, LsE3, LrB2, LrC2, LrD2, LrE2, LrF2).	Fair	Poor	Not suitable	Not suitable	Limestone is at a depth of 2 to 3 feet.
Lowell (LvD2, LwE3)	Not suited	Poor	Not suitable	Not suitable	Limestone is at a depth of 2 to 3 feet.
Melvin (Me)	Good	Fair	Not suitable	Not suitable	At least 2 to 4 feet above the highest point reached by high water.
Monongahela (MfB, MfC, MfC2).	Good	Poor to fair; erodible above a depth of 1½ to 2 feet; poor to good below that depth.	Poor; thick overburden.	Not suitable	Bedrock is at a depth of 5 feet or more; seepage in cuts at times.[5]
Monongahela (MgA, MgB, MgC, MgC2).	Good	Fair	Not suitable	Not suitable	Bedrock is at a depth of 5 feet or more; seepage in cuts at times.[5]
Mullins (Mm)	Good	Poor to fair	Not suitable	Not suitable	At least 2 feet above the surface of the ground; shale or sandstone is at a depth of 6 to 8 feet; seepage in cuts at times.[5]
Muse (MnC, MnD, MsC2, MsD2).	Good	Fair	Not suitable	Not suitable	Bedrock is at a depth of 5 feet or more.
Muskingum (MuD, MuE, MuF, MuG).	Not suitable	Good	Not suitable	Limited	Sandstone or shale is at a depth of 1 to 3 feet.
Newark (Ne)	Good	Fair	Not suitable	Not suitable	At least 2 to 4 feet above the highest point reached by high water.

See footnotes at end of table.

and selected characteristics that affect engineering practices—Continued

Characteristics that affect engineering practices					
Susceptibility to —		Farm ponds [3]	Agricultural drainage	Irrigation [4]	Terraces and diversions
Frost action	Erosion of cuts and fills				
Moderate to very high.	Slight	Excessive seepage; not suitable for core material.	Not needed	None	None.
Moderate to high.	Slight	Some seepage; not suitable for core material.	Not needed	None	None.
Moderate to high.	Slight	Some seepage; not suitable for core material; shallow to bedrock.	Not needed	None	None.
Moderate to high.	Slight	Slight to excessive seepage; gravelly soil material.	Not needed	None	In many areas difficult to establish outlet.
Moderate to high.	Slight	Very little seepage; core requires compaction.	Needs drainage; requires careful evaluation of compact layers before tiling.	Shallow to compact layers; low rate of infiltration.	Care is needed to prevent ponding in the channels.
Moderate to high.	Slight	Slight seepage; may require blanket lining.	Needs drainage; tile and open ditches suggested.	Low rate of infiltration.	Chert beds; care is needed to prevent ponding in the channels.
Moderate to high.	Slight	Slight seepage; may require blanket lining.	Needs drainage; requires careful evaluation of compact layers before tiling.	Shallow to compact layer; low rate of infiltration.	Not needed.
Moderate to high.	Slight	Some seepage; not suitable for core material.	Not needed in most areas.	None	None.
Moderate	Moderate	Excessive seepage; possible caverns in bedrock; requires blanket lining.	Not needed	None	Outlets erodible; slow rate of infiltration where eroded.
Moderate	Moderate	Some seepage; difficult to core narrow draws.	Not needed	Low rate of infiltration.	Outlets erodible; slow rate of infiltration; difficult to seed channels.
Moderate	Moderate	Excessive seepage; requires blanket lining; bedrock near surface.	Not needed	Low rate of infiltration.	Very rocky; outlets erodible.
Moderate to high.	Slight	Some seepage; not suitable for core material.	Needs drainage; tile and open ditches suggested.	None	None.
Moderate to high.	Moderate to severe.	Underlying material is variable; may need blanket lining.	Not needed in most areas.	None	Care is needed to prevent ponding in the channels.
Moderate to high.	Slight	Underlying material is variable; may need blanket lining.	Not needed in most areas.	None	Care is needed to prevent ponding in the channels.
Moderate to high.	Slight	Some seepage; not suitable for core material.	Needs drainage; needs careful evaluation of compact layers before tiling.	Shallow over compact layers; low rate of infiltration.	Not needed.
Moderate	Moderate	Slight seepage; suitable for pit ponds.	Not needed	None	Irregular slopes; difficult to establish grass in the channels.
Slight to moderate.	Slight	Very little seepage; core requires compaction; shallow to bedrock.	Not needed	Shallow to bedrock	Shallow to rock.
Moderate to high.	Slight	Some seepage; not suitable for core material.	Needs drainage	None	None.

644–670—63——7

TABLE 9.—*Estimated suitability of the soils for use in construction,*

Soil series and map symbols	Suitability of soil material for— Topsoil [1]	Road fill	Source of sand and gravel	Winter grading [2]	Recommended location of gradeline with respect to ground surface
Nicholson (NkB)	Good	Fair	Not suitable	Not suitable	Interbedded siltstone and limestone is at a depth of 4 to 6 feet; seepage in cuts at times.[5]
Otway (OtC, OtC2, OtD2, OtE2, OtF2).	Fair	Poor	Not suitable	Not suitable	Shale is at a depth of 2 to 5 feet.
Philo (Ph)	Good	Poor to fair; erodible.	Not suitable	Not suitable	At least 2 to 4 feet above the highest point reached by high water.
Pope (Pm)	Good	Poor to fair; erodible.	Poor	Limited	At least 2 to 4 feet above the highest point reached by high water.
Pope (Pn)	Fair	Good	Poor to fair; excess fines and high water table.	Limited	At least 2 to 4 feet above the highest point reached by high water.
Pope (Po)	Good	Fair	Not suitable	Limited	At least 2 to 4 feet above the highest point reached by high water.
Purdy (Pr)	Good	Fair	Not suitable	Not suitable	At least 2 feet above the surface of the ground; seepage in cuts common.[5]
Rarden (RaB, RaC, RaD, RcC2, RcD2).	Good	Poor	Not suitable	Not suitable	Shale is at a depth of 2 to 4 feet; seepage in cuts during wet periods.
Robertsville (Re)	Good	Fair	Not suitable	Not suitable	At least 4 feet above the highest point reached by the water table; seepage in cuts at times.[5]
Rockcastle (RkD, RkE, RkF, RsD2, RsE2).	Good to fair	Poor	Not suitable	Not suitable	Shale is at a depth of 1 to 3 feet.
Sees (SaB, SaC)	Fair	Poor	Not suitable	Not suitable	Bedrock is at a depth of 5 feet or more; seepage in cuts at times.
Sequatchie (ScA)	Fair	Fair to poor	Not suitable	Not suitable	Anywhere
Shelbyville (SeB, SeC, SeC2).	Excellent	Fair	Not suitable	Not suitable	Interbedded siltstone and limestone is at a depth of 3 to 6 feet.
Shrouts (ShD2, ShE2, SsD)	Poor	Poor	Not suitable	Not suitable	Shale is at a depth of 2 feet; possibility of slumping in cuts.
Stendal (St)	Good	Fair	Not suitable	Not suitable	At least 2 to 4 feet above the highest point reached by high water.
Taft (Ta)	Good	Fair	Not suitable	Not suitable	At least 4 feet above the highest point reached by the water table; seepage in cuts common.[5]
Terrace escarpments (Tc)	Fair	Fair	Poor	Limited	Anywhere
Tilsit (TsB, TsC)	Good	Fair	Not suitable	Not suitable	Interbedded siltstone and shale at a depth of 3 to 5 feet; seepage in cuts at times.[5]

See footnotes at end of table.

and selected characteristics that affect engineering practices—Continued

Characteristics that affect engineering practices					
Susceptibility to—		Farm ponds [3]	Agricultural drainage	Irrigation [4]	Terraces and diversions
Frost action	Erosion of cuts and fills				
Moderate	Slight	Excessive seepage; possible caverns in bedrock; requires blanket lining.	Not needed in most places.	None	Care needed to prevent ponding in channels.
Moderate	Moderate	Slight seepage in sandy pockets; hard to dig in dry weather.	Not needed	Low rate of infiltration	Highly erodible; difficult to establish grass in channels.
Moderate to high.	Slight	Some seepage; not suitable for core material.	Usually not suited	None	None.
High	Moderate to severe.	Excessive seepage; not suitable for core material.	Not needed	None	None.
Moderate to high.	Slight	Excessive seepage; not suitable for core material.	Not needed	Low moisture-holding capacity.	None.
Moderate to very high.	Slight	Some seepage; not suitable for core material.	Not needed	None	None.
Moderate to high.	Slight	Underlying material is variable; may need blanket lining.	Drainage needed; requires careful evaluation of compact layers before tiling.	Shallow to compact layers; low rate of infiltration.	Not needed.
Moderate	Moderate	Very little seepage; suitable for pit ponds.	Not needed	Low rate of infiltration	Irregular slopes; slow rate of infiltration in channels, and difficult to establish grass.
Moderate to high.	Slight	Underlying material is variable; may need blanket lining.	Drainage needed; requires careful evaluation of compact layers before tiling.	Shallow to compact layers; low rate of infiltration.	Not needed.
Moderate	Severe	Very little seepage; shallow over clay shale.	Not needed	Shallow over clay shale; low rate of infiltration.	Shale close to surface in places; slow rate of infiltration in channels, and difficult to establish grass.
Moderate	Moderate	Slight seepage; suitable for pit ponds.	Drainage needed; tile and open ditches suggested.	None	Difficult to work.
Moderate	Moderate	Slight seepage; not suitable for core material.	Not needed	None	Not needed.
Moderate	Moderate	Excessive seepage; possible caverns in bedrock; requires blanket lining.	Not needed	None	None.
Moderate	Severe	Very little seepage; shallow over clay shale.	Not needed	Shallow over clay shale; low rate of infiltration.	Shale close to surface in places; slow rate of infiltration in channels, and difficult to establish grass.
Moderate to high.	Slight	Some seepage; not suitable for core material.	Drainage needed; tile and open ditches suggested.	None	None.
Moderate to high.	Slight	Underlying material is variable; may need blanket lining.	Drainage needed; requires careful evaluation of compact layers before tiling.	Shallow over compact layer; low rate of infiltration.	Not needed.
High	Moderate	Slight seepage; blanket liner required.	Not needed	None	None.
Moderate to high.	Slight	Slight seepage; core requires compaction.	Not needed in most places.	Low rate of infiltration.	Care is needed to prevent ponding in the channels.

TABLE 9.—*Estimated suitability of the soils for use in construction,*

Soil series and map symbols	Suitability of soil material for—				Recommended location of grade-line with respect to ground surface
	Topsoil [1]	Road fill	Source of sand and gravel	Winter grading [2]	
Trappist (TtB, TtC2, TtD2)	Good	Fair	Not suitable	Not suitable	Shale is at a depth of 2 to 5 feet
Tyler (Tv)	Good	Fair	Poor; thick overburden and high water table.	Not suitable	At least 4 feet above the highest point reached by the water table; seepage in cuts common.[5]
Tyler (Ty)	Good	Fair	Not suitable	Not suitable	At least 4 feet above the highest point reached by the water table; seepage in cuts common.[5]
Whitwell (Wh)	Good	Fair; poor below a depth of 3½ to 4 feet.	Not suitable	Not suitable	Bedrock is at a depth of 5 feet or more; the water table is high at times.
Woolper (WoB, WoC, WoD2).	Fair	Poor	Not suitable	Not suitable	Bedrock is at a depth of 5 feet or more.

[1] Rating is for the surface layer, or A horizon, for use on embankments and cut slopes, and in ditches to promote the growth of vegetation. Eroded and severely eroded soils were not considered.

[2] The suitability rating is for the soil material; rock excavation is possible during the winter.

[5] Seepage varies as the result of variations in the permeability of the underlying rocks. A blanket lining consists of a fine-textured layer of compacted soil or of chemical treatment.

Soil test data

Table 10 gives the engineering test data for soil samples from profiles of five soil series. The data were based on laboratory tests made on samples obtained by the Soil Conservation Service and tested by the Bureau of Public Roads.

The soil samples were tested in accordance with standard engineering procedures of the American Association of State Highway Officials (*1*), to help evaluate the soils for engineering purposes. The depth of sampling was limited to 5 to 6 feet at maximum; hence, the results obtained for the samples tested may not be representative for the material below that depth. The table shows the results obtained when the samples were tested for moisture density. It also shows the results of mechanical analysis and of tests to determine plasticity.

Liquid limit refers to the moisture content at which the soil material passes from a plastic to a liquid state (*8*). It is expressed as a percentage of the ovendry weight of the soil. The plastic limit refers to the moisture content at which the soil material passes from a semisolid to a plastic state and is expressed as a percentage of the ovendry weight of the soil.

The plasticity index is the numerical difference between the liquid limit and the plastic limit and is expressed in percentage of moisture. A small figure shown for the plasticity index indicates that a small change in the content of moisture will change the soil from a semisolid to a liquid state. A large figure shows that a great amount of change is needed in the content of moisture to change the soil from a semisolid to a liquid state.

Table 10 also gives compaction (moisture-density) data for the tested soils. If a soil material is compacted at a successively higher moisture content, assuming that the compactive effort remains constant, the density of the compacted material will increase until the optimum moisture content is reached. After that, the density decreases with increase in moisture content. The highest dry density obtained in the compaction test is termed maximum dry density.

The engineering soil classifications given in table 10 are based on data obtained by mechanical analyses and by tests to determine the liquid limits and plastic limits of the soils. Mechanical analyses were made by combined sieve and hydrometer methods. The mechanical analyses used are not suitable for use in naming the textural classes of soils.

Engineering classification systems

Most highway engineers classify soil materials in accordance with the system approved by the American Association of State Highway Officials (*1*). In this system soil materials are classified in seven principal groups. The groups range from A–1, consisting of gravelly soils of high bearing capacity, to A–7, consisting of clay soils that have low strength when wet. These groups are shown in table 11.

and selected characteristics that affect engineering practices—Continued

Characteristics that affect engineering practices						
Susceptibility to—		Farm ponds [3]	Agricultural drainage	Irrigation [4]	Terraces and diversions
Frost action	Erosion of cuts and fills				
Moderate	Moderate	Some seepage; seal blanket required in places; black fissile shale at a depth of 30 to 38 inches.	Not needed	None	Some irregular slopes.
High	Moderate to severe.	Underlying material is variable; may need blanket lining.	Drainage needed; requires careful evaluation of compact layers before tiling.	Shallow over compact layer.	Not needed.
Moderate to high.	Slight	Underlying material is variable; may need blanket lining.	Drainage needed; requires careful evaluation of compact layers before tiling.	Shallow over compact layer.	Not needed.
Moderate	Slight	Slight seepage; not suitable for core material.	Not needed in most areas.	None	Not needed.
Moderate	Moderate	Slight seepage; suitable for pit ponds.	Not needed	None	Difficult to work; difficult to establish an outlet in many areas.

[4] Soils that have a capacity of less than 0.11 inch per inch were considered to have low water-holding capacity. Soils that have a low rate of infiltration were those in which water infiltrates at a rate of less than 0.4 inch per hour.

[5] A compact layer (fragipan) causes the water table to be high during wet periods.

TABLE 10.—*Engineering test data [1] for soil samples taken from profiles of five soil series*

Soil	Depth	Classification: Unified [2]	Classification: AASHO [3]	Grain-size distribution [4]: Percentage passing sieve [5]— No. 10	No. 40	No. 200	Percentage smaller than [5]— 0.050 mm.	0.020 mm.	0.005 mm.	0.002 mm.	Liquid limit	Plasticity index	Moisture density: Maximum dry density	Optimum moisture
Johnsburg silt loam: S55Ky-6-22 (Modal profile)—	*Inches*										*Percent*	*Percent*	*Lb. per cu. ft.*	*Percent*
S 30394	3–8	ML–CL	A–4(8)	99	97	95	95	80	40	24	32	9	107	17
S 30395	13–18	ML–CL	A–6(10)	100	99	98	98	89	52	32	38	14	107	18
S 30396	25–40	ML–CL	A–6(10)	100	99	98	98	89	53	34	40	16	108	18
S 30397	40–47	ML–CL	A–7–6(12)	97	96	95	95	89	60	41	42	18	109	18
S55Ky-6-23—														
S 30398	0–5	ML	A–4(8)	97	94	92	91	75	34	19	36	8	102	19
S 30399	9–14	ML–CL	A–4(8)	97	94	92	90	76	40	23	31	9	110	17
S 30400	21–30	ML–CL	A–6(10)	98	96	95	95	83	46	27	39	14	106	20
S 30401	30–38	ML–CL	A–6(10)	98	97	96	96	85	51	32	40	15	105	19
Colyer shaly silt loam: S55Ky-6-18 (Modal profile)—														
S 30382	0–5	ML	A–4(6)	80	69	65	63	54	35	22	39	9	101	20
S 30383	5–12	ML	A–7–5(9)	90	85	82	80	71	50	32	42	11	99	23
S 30384	18–21	MH	A–7–5(12)	69	66	65	65	61	8	35	52	20	98	24

See footnotes at end of table.

TABLE 10.—*Engineering test data*[1] *for soil samples taken from profiles of five soil series*—Continued

Soil	Depth	Classification		Grain-size distribution[4]							Liquid limit	Plasticity index	Moisture density	
				Percentage passing sieve[5]—			Percentage smaller than[5]—							
		Unified[2]	AASHO[3]	No. 10	No. 40	No. 200	0.050 mm.	0.020 mm.	0.005 mm.	0.002 mm.			Maximum dry density	Optimum moisture
Colyer shaly silt loam—Continued														
S55Ky-6-19	*Inches*										*Percent*	*Percent*	*Lb. per cu. ft.*	*Percent*
S 30385	5–11	ML	A-4(8)	96	90	86	85	76	49	31	40	9	97	23
S 30386	11–19	ML	A-7-6(9)	85	83	82	82	73	54	35	41	13	100	23
S 30387	19–26	ML	A-7-5(11)	88	86	84	84	76	57	40	45	15	98	24
Lowell silt loam:														
S55Ky-6-14 (Modal profile)—														
S 30402	3–12	ML-CL	A-6(10)	100	99	96	95	80	46	32	40	14	102	22
S 30403	18–23	CH	A-7-6(19)	100	99	96	96	87	60	50	56	29	101	22
S 30404	30–39	CH	A-7-6(20)	------	------	99	99	92	72	61	67	38	99	23
S55Ky-6-15—														
S 30405	4–9	ML-CL	A-6(9)	100	97	95	91	72	41	30	38	13	104	20
S 30406	16–31	CH	A-7-6(18)	100	99	98	95	82	61	51	54	27	100	22
S 30407	31–61	MH-CH	A-7-6(16)	------	------	99	97	82	59	48	52	24	100	23
Rarden silt loam:														
S55Ky-6-20—														
S 30408	3–10	ML	A-4(8)	99	96	93	91	69	36	22	33	6	104	19
S 30409	10–15	ML-CL	A-7-6(13)	------	------	100	99	93	62	42	45	19	104	20
S 30410	22–35	ML-CL	A-7-6(13)	------	------	------	100	92	59	42	45	20	111	16
S55Ky-6-21—														
S 30411	0–8	ML-CL	A-6(9)	100	99	97	97	87	48	30	36	12	106	18
S 30412	12–22	ML-CL	A-7-6(12)	100	99	98	98	90	55	37	44	19	107	18
S 30413	22–34	ML-CL	A-7-6(15)	------	------	100	99	96	70	46	50	22	110	17
Shelbyville silt loam:														
S55Ky-6-12 (Modal profile)—														
S 30414	0–11	ML-CL	A-6(10)	100	97	95	94	82	46	32	37	14	106	19
S 30415	24–31	CL	A-6(11)	100	94	90	89	77	48	35	40	18	108	19
S 30416	31–37	CH	A-7-5(20)	100	97	94	94	87	70	60	74	42	95	26
S 30417	37–52	CH	A-7-6(20)	99	95	92	91	86	66	54	61	34	99	23
S55Ky-6-13 (Not a modal profile)—														
S 30418	5–14	ML-CL	A-4(8)	100	96	94	91	72	37	24	33	9	106	18
S 39419	21–28	CL	A-7-6(13)	100	98	97	95	79	53	42	44	20	107	19
S 30420	28–68	CH	A-7-6(20)	------	------	99	98	85	63	54	59	31	100	23

[1] Tests performed by the Bureau of Public Roads in accordance with standard procedures of the American Association of State Highway Officials (AASHO).

[2] Based on the Unified Soil Classification System, Tech. Memo. No. 3-357, v. 1, Waterways Expt. Sta., Corps of Engin., March 1953.

[3] Based on Standard Specifications for Highway Materials and Methods of Sampling and Testing. The Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes, AASHO Designation M 145-49.

[4] Mechanical analyses according to the AASHO Designation T 88. Results by this procedure frequently differ somewhat from results that would have been obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters in diameter is excluded from calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for use in naming the textural classes of soils.

[5] Based on sample as received in the laboratory. Laboratory test data were not corrected for amount discarded in field sampling. Sample 30383 had 15 percent larger than 3 inches across discarded in field, and sample 30387 had 30 percent larger than 3 inches across discarded in the field.

Within each of the principal groups, the relative engineering value of the soil material is indicated by a group index number. Group index numbers range from 0 for the best material to 20 for the poorest. For the soils tested, the group index number is shown in parentheses, following the soil group symbol, in the fourth column of table 10.

Some engineers prefer to use the Unified Soil Classification system (*17*). In this system the soils are identified according to their texture and plasticity and are grouped according to their performance as engineering construction materials. The system establishes 15 soil groups, which are divided as (1) coarse-grained soils (eight classes), (2) fine-grained soils (six classes), and (3) highly organic soils. These groups are shown in table 12. The classification of the tested soils according to the Unified system is given in the third column of table 10.

TABLE 11.—*Classification of soils by American*

General classification	Granular materials (35 percent or less passing No. 200 sieve)				
Group classification	A-1		A-3	A-2	
	A-1-a	A-1-b		A-2-4	A-2-5
Sieve analysis: Percent passing—					
No. 10	50 maximum.				
No. 40	30 maximum.	50 maximum.	51 minimum.		
No. 200	15 maximum.	25 maximum.	10 maximum.	35 maximum.	35 maximum.
Characteristics of fraction passing No. 40 sieve:					
Liquid limit	----------	----------	NP [2]	40 maximum.	41 minimum.
Plasticity index	6 maximum.	6 maximum.	NP [2]	10 maximum.	10 maximum.
Group index	0	0	0	0	0
Usual types of significant constituent materials.	Stone fragments, gravel, and sand.	Stone fragments, gravel, and sand.	Fine sand.	Silty gravel and sand.	Silty gravel and sand.
General rating as subgrade	Excellent to good				

[1] Based on Standard Specifications for Highway Materials and Methods of Sampling and Testing (pt. 1; ed. 7): The Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes AASHO Designation: M 145-49.

[2] NP—Nonplastic.

[3] Plasticity index of A-7-5 subgroup is equal to or less than LL minus 30. Plasticity index of A-7-6 subgroup is greater than LL minus 30.

Formation, Morphology, and Classification of Soils

In this section are described the factors that affect soil formation. Also discussed are the morphology and classification of the soils.

Formation of Soils

Soils are natural bodies that occupy parts of the earth's surface. They have properties as the result of the integrated effects of climate and living organisms acting upon parent material as influenced by relief over periods of time. All five of these factors—climate, plant and animal life, parent material, relief, and time—come into play in the formation of a soil. Climate and living matter may vary little throughout a county, but there are many local differences in relief, parent material, and time, or age.

Climate

Climate is directly or indirectly responsible for variations in plant and animal life, for major differences among the soils, and, to a certain extent, for the characteristics of many important rock formations. It affects the weathering of rocks and the removal and deposition of materials by water. It is also responsible for the percolation of water through the soil.

The soils of Bath County formed under a humid, temperate climate. Under the present-day climate, the soils are moist and are subject to leaching throughout the year, except for short, dry periods in summer. Over a period of 15 years when records were kept, the average annual precipitation in the county was found to be 46.91 inches. The highest average precipitation for any month during that period was 5.06 inches in July, and the next highest was 4.82 inches in January. The least precipitation for any month was 2.24 inches, recorded for October. The average temperature was 56.4° F.

Bath County is near the boundary of the climatic zones where the Gray-Brown Podzolic and Red-Yellow Podzolic soils developed. The normal soils that show the influence of climate have a leached, acid surface layer. They have an illuviated subsoil that is finer textured than the surface layer and is strong brown, yellowish brown, reddish brown, or yellowish red.

Active in forming the soils was a process called podzolization, in which excess water percolated through the soil. The water carried dissolved materials and smaller particles into the lower horizons or out of the soil altogether. In this way compounds of iron and aluminum, clay minerals, and bases, such as calcium, moved downward from the surface soil. As the content of iron and aluminum was lowered, the color of the surface layer became duller and less red than that of the subsoil. This is because iron compounds in the soil turn red when they are oxidized.

Temperature influences the kinds and amounts of living matter in the soil and affects the rate of chemical action. Other things being equal, a warm climate allows iron in the soils to oxidize rapidly, and, as a result, the soils have a reddish color. Where the climate is cool, oxidation is slower and the soils have a brown or gray color.

Association of State Highway Officials[1]

Granular materials (35 percent or less passing No. 200 sieve)—Continued		Silt-clay materials (More than 35 percent passing No. 200 sieve)				
A-2—Continued		A-4	A-5	A-6	A-7	
A-2-6	A-2-7				A-7-5	A-7-6
35 maximum.	35 maximum.	36 minimum.	36 minimum.	36 minimum.	36 minimum.	36 minimum.
40 maximum. 11 minimum.	41 minimum. 11 minimum.	40 maximum. 10 maximum.	41 minimum. 10 maximum.	40 maximum. 11 minimum.	41 minimum. 11 minimum.[3]	41 minimum. 11 minimum.[3]
4 maximum.	4 maximum.	8 maximum.	12 maximum.	16 maximum.	20 maximum.	20 maximum.
Clayey gravel and sand.	Clayey gravel and sand.	Nonplastic to moderately plastic silty soils.	Highly elastic silts.	Medium plastic clays.	Highly plastic clays.	Highly plastic clays.
Fair to poor						

Plant and animal life

Plants and animals are important in the formation of a soil. Plants affect the formation of soils by adding organic matter. Animals, fungi, and bacteria contribute mainly by converting the remains of plants to organic matter. Subsequently, they cause the organic matter to decompose. They also aid in the weathering of rocks. Some bacteria, which are less common in wooded areas than fungi, change the nitrogen in the soil to an available form. This process is known as nitrogen fixation. The larger plants alter the microclimate of the soil and transfer elements from the subsoil to the surface layer.

Plants and animals add organic matter (humus) to the surface soil. The organic matter imparts a dark color to the soil material. It also has much to do with the structure of the soil, although climate and parent material also affect structure, as do the texture of the soil, the chemical nature of the fine clay in the soil, and drainage. Largely because there is more organic matter in the surface layer than in the lower horizons, many soils have granular structure in the surface layer and blocky structure in the subsoil.

The kind of plants that grow on a soil is important. Grasses add more organic matter than trees. Consequently, the upper part of the profile in a soil formed under grass is commonly darker colored and has a more granular structure than that of a soil formed under forest.

The soils of this county formed mainly under a hardwood forest, and about 30 percent of the county is still covered by trees, mostly second growth. On the more fertile soils of the uplands are mainly mixed oaks, hickory, blackgum, and beech, and on the less fertile soils are Virginia pines. Sycamore, willow, red maple, sweetgum, and beech grow on the wet soils. Redcedar, locust, hackberry, elm, ash, and walnut grow mainly in the northern part of the county on the steep areas underlain by limestone, and there are a few oaks in those areas.

The environment in which the soils formed was changed by man when he cleared the areas. Most of the areas have been limed and seeded to grasses and legumes since the trees were cut. Some areas cleared by man were changed as the result of erosion. The main change, however, is that now a plow layer has replaced the thin, dark, organic-mineral layer over a leached layer that was typical of many soils. Some wet soils have been artificially drained, and many soils have had commercial fertilizer, lime, and manure added to further change them.

Parent material

Parent material is the unconsolidated mass from which a soil develops. It formed as the result of weathering or decomposition of rocks and minerals. The weathering or decomposition of the rocks was brought about by the natural physical and chemical forces of climate and living matter.

The parent material from which the soils of Bath County formed is of three main kinds: (1) Local alluvium transported by water and gravity from the sides of hills and deposited on the areas below; (2) alluvium deposited by streams; and (3) material weathered from rocks in place.

644-670—63——8

TABLE 12.—*Characteristics of soil groups*

Major divisions	Group symbol	Soil description	Value as foundation material [2]	Value as base course directly under bituminous pavement
Coarse-grained soils (*50 percent or less passing No. 200 sieve*):				
Gravels and gravelly soils (*more than half of coarse fraction retained on No. 4 sieve*).	GW	Well-graded gravels and gravel-sand mixtures; little or no fines.	Excellent	Good
	GP	Poorly graded gravels and gravel-sand mixtures; little or no fines.	Good to excellent	Poor to fair
	GM	Silty gravels and gravel-sand-silt mixtures.	Good	Poor to good
	GC	Clayey gravels and gravel-sand-clay mixtures.	Good	Poor
Sands and sandy soils (*more than half of coarse fraction passing No. 4 sieve*).	SW	Well-graded sands and gravelly sands; little or no fines.	Good	Poor
	SP	Poorly graded sands and gravelly sands; little or no fines.	Fair to good	Poor to not suitable.
	SM	Silty sands and sand-silt mixtures	Fair to good	Poor to not suitable.
	SC	Clayey sands and sand-clay mixtures	Fair to good	Not suitable
Fine-grained soils (*more than 50 percent passing No. 200 sieve*):				
Silts and clays (*liquid limit of 50 or less*).	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands, and clayey silts of slight plasticity.	Fair to poor	Not suitable
	CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, and lean clays.	Fair to poor	Not suitable
	OL	Organic silts and organic clays having low plasticity.	Poor	Not suitable
Silts and clays (*liquid limit greater than 50*).	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, and elastic silts.	Poor	Not suitable
	CH	Inorganic clays having high plasticity and fat clays.	Poor to very poor	Not suitable
	OH	Organic clays having medium to high plasticity and organic silts.	Poor to very poor	Not suitable
Highly organic soils	Pt	Peat and other highly organic soils	Not suitable	Not suitable

[1] Based on information in The Unified Soil Classification System, Tech. Memo. No. 3–357, v. 1, 2, and 3. Waterways Experiment Station, Corps of Engineers, 1953 (*17*). Ratings and ranges in test values are for guidance only. Design should be based on field survey and test of samples from construction site.

in Unified soil classification system [1]

Value for embankments	Compaction: Characteristics and recommended equipment	Approximate range in AASHO maximum dry density [3]	Field (in-place) CBR	Subgrade modulus k	Drainage characteristics	Comparable groups in AASHO classification
		Lb./cu. ft.		*Lb./sq. in./in.*		
Very stable; use in pervious shells of dikes and dams.	Good; use crawler-type tractor, pneumatic-tire roller, or steel-wheel roller.	125–135	60–80	300+	Excellent	A–1.
Reasonably stable; use in pervious shells of dikes and dams.	Same	115–125	25–60	300+	Excellent	A–1.
Reasonably stable; not particularly suited to shells, but may be used for impervious cores or blankets.	Good, but needs close control of moisture; use pneumatic-tire or sheepsfoot roller.	120–135	20–80	200–300+	Fair to practically impervious.	A–1 or A–2.
Fairly stable; may be used for impervious core.	Fair, use pneumatic-tire or sheepsfoot roller.	115–130	20–40	200–300	Poor to practically impervious.	A–2.
Very stable; may be used in pervious sections; slope protection required.	Good; use crawler-type tractor or pneumatic-tire roller.	110–130	20–40	200–300	Excellent	A–1.
Reasonably stable; may be used in dike section having flat slopes.	Same	100 120	10 25	200 300	Excellent	A–1 or A–3.
Fairly stable; not particularly suited to shells, but may be used for impervious cores or dikes.	Good, but needs close control of moisture; use pneumatic-tire or sheepsfoot roller.	110–125	10–40	200–300	Fair to practically impervious.	A–1, A–2, or A–4.
Fairly stable; use as impervious core for flood-control structures.	Fair; use pneumatic-tire roller or sheepsfoot roller.	105–125	10–20	200–300	Poor to practically impervious.	A–2, A–4, or A–6.
Poor stability; may be used for embankments if properly controlled.	Good to poor; close control of moisture is essential; use pneumatic-tire or sheepsfoot roller.	95–120	5–15	100–200	Fair to poor	A–4, A–5, or A–6.
Stable; use in impervious cores and blankets.	Fair to good; use pneumatic-tire or sheepsfoot roller.	95–120	5–15	100–200	Practically impervious	A–4, A–6, or A–7.
Not suitable for embankments	Fair to poor; use sheepsfoot roller.[4]	80–100	4–8	100–200	Poor	A–4, A–5, A–6, or A–7.
Poor stability; use in core of hydraulic fill dam; not desirable in rolled fill construction.	Poor to very poor; use sheepsfoot roller.[4]	70–95	4–8	100–200	Fair to poor	A–5 or A–7.
Fair stability on flat slopes; use in thin cores, blankets, and dike sections of dams.	Fair to poor; use sheepsfoot roller.[4]	75–105	3–5	50–100	Practically impervious	A–7.
Not suitable for embankments	Poor to very poor; use sheepsfoot roller.[4]	65–100	3–5	50–100	Practically impervious	A–5 or A–7.
Not used in embankments, dams, or subgrades for pavements.					Fair to poor	None.

[2] Ratings are for subgrade and subbases for flexible pavement.
[3] Determined in accordance with test designation: T 99–49, AASHO (*1*).
[4] Pneumatic-tire rollers may be advisable, particularly when moisture tconten is higher than optimum.

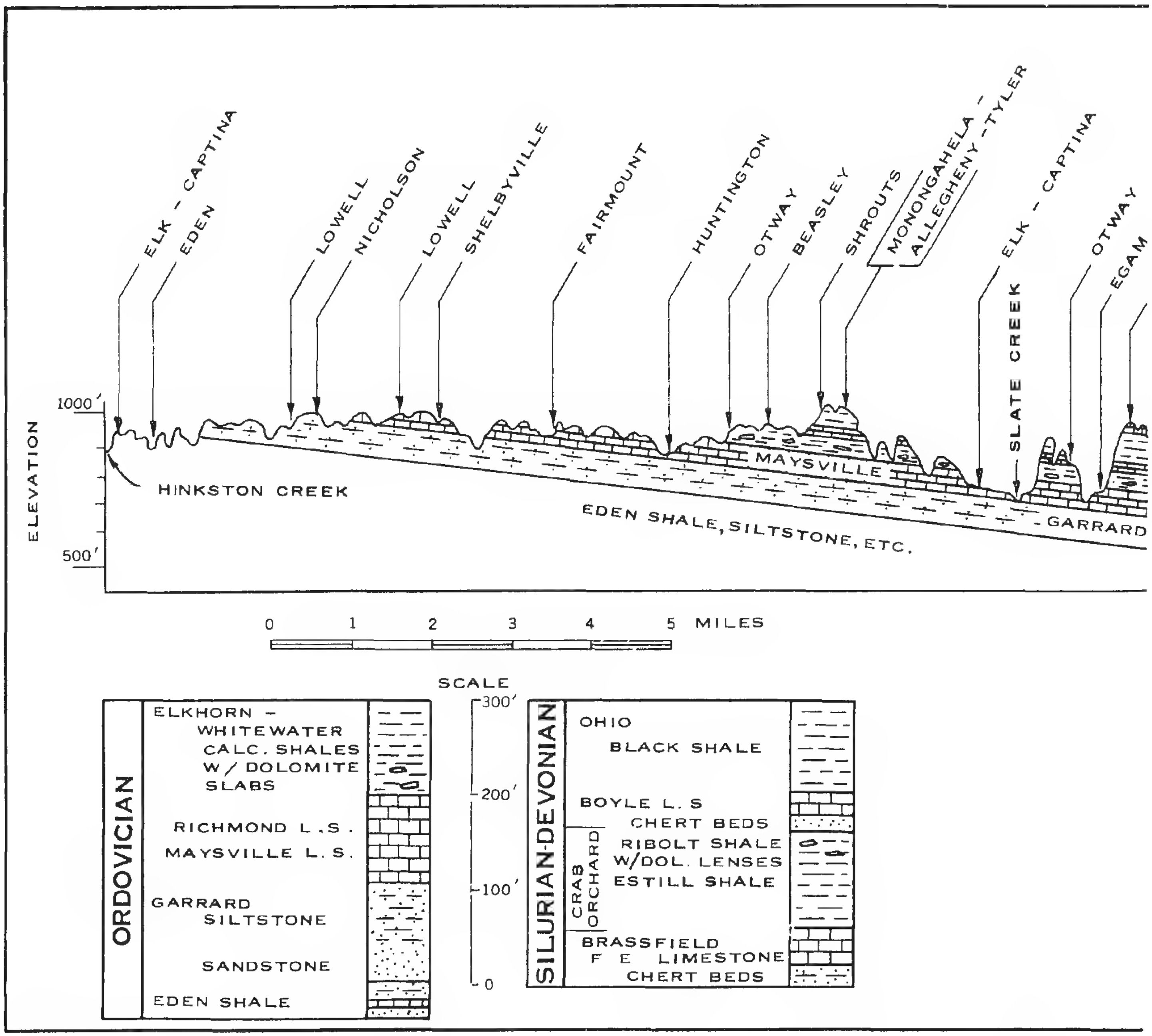
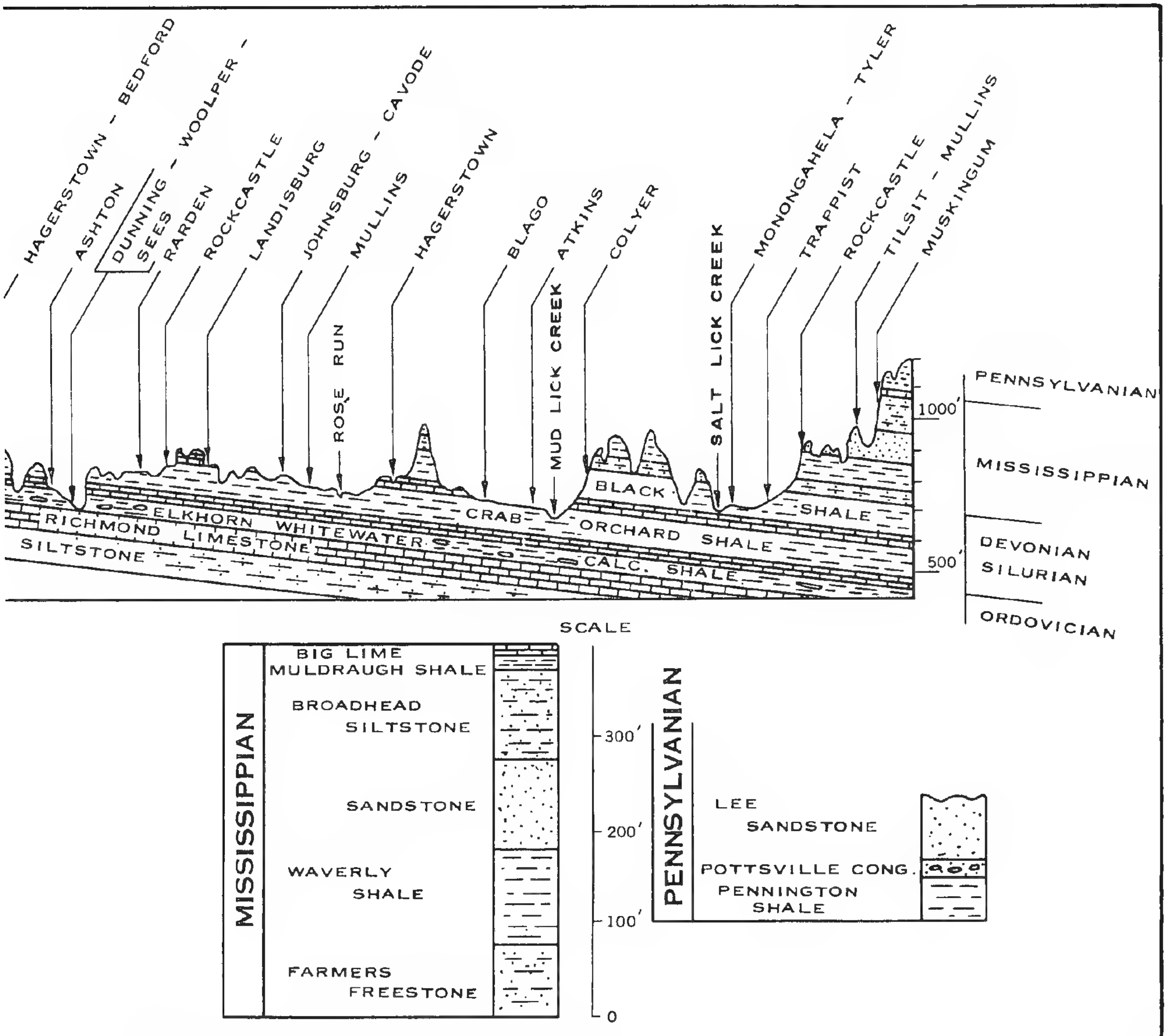


Figure 11.—**Cross section of Bath County showing the major**

The soils of the Ashton and Cruze series are examples of soils formed in local alluvium. The parent material of these soils washed or fell from soils on the sides of hills and was deposited at the foot of the slope. The soils of the Blago and Dunning series are examples of soils formed in alluvium deposited by streams.

The parent material of the soils formed in material weathered from rocks in place was all derived from sedimentary rocks that are comparatively soft. The soils formed in this kind of parent material have a wide range of texture because of differences in the texture of the parent rock. Most of the rocks in the northern and western parts of the county are calcareous, and most of these in the eastern part of the county are acid. Soils formed in material weathered from the calcareous rocks are darker colored than those formed in acid material, and they are fairly high in calcium or other basic minerals.

The Otway and Fairmount soils are examples of soils in which formation was dominated by the parent material. These soils formed in parent material so high in lime that the surface soil was kept supplied with calcium that combined with the organic matter and made the soil colloids immobile. Thus, climate and plants and animals were not allowed to exert their full influence on the development of these soils. As a result, the Otway and Fairmount soils have a dark-colored, fine-textured, granular surface layer



soils and their relationship to the rock formations and to relief.

over a subsoil of olive-gray, heavy clay. This soil-forming process is called calcification, and the soils formed as the result of it are called Rendzinas.

The fine-textured shales in the knobby areas of the county are very slowly permeable to water. This is one reason why the Rockcastle soils, formed in material derived from these shales, show weak profile development.

The reddish color of the subsoil in the Hagerstown and Beasley soils was probably caused by the presence of iron ore in the parent material.

The soils of Bath County have been influenced strongly by the type of rocks from which the parent material was derived. The rocks lie in fairly thin formations across the county, and there is a slight geological dip (less than 1 percent) from northwest to southeast. Figure 11 shows the relationship of the soils to the underlying rocks and to relief.

Relief

Relief influences the formation of soils primarily through its effect upon drainage and erosion. It also influences the formation of soils through variations in exposure to sun, wind, air drainage, and plant cover. Differences in relief affect the amount of moisture within the soil, although the amount of moisture that enters the soil is not directly proportional to the slope of the land.

Soils are not uniform in slope, and even a slight undulation of the surface causes water to drain away from the high places and to collect in lower areas. The amount of water that enters the soil also varies according to the permeability of the different soils and their parent material. Relief varies greatly throughout the county, but it may be described as excessive, normal, subnormal, and flat or concave.

Excessive relief is that of the steep or convex slopes. Here, soils develop more slowly than on normal slopes because of the rapid runoff, erosion, and reduced percolation of water through the soil. Where relief is excessive, the soils have weak horizon development and are shallow. They are called Lithosols.

Subnormal relief is that of nearly flat or gently sloping areas where runoff is slow to very slow. The soils in these areas were excessively wet while their profile was forming, and, as a result, their subsoil is gray because of the lack of oxidation. This process is called gleization. In time, a fragipan develops in soils that have subnormal relief. Poorly drained soils that have a fragipan are called Planosols, and they formed as the result of gleization and podzolization.

Where the relief is flat or concave, as in swamps or depressed areas, the soils developed where there was still more moisture than in areas of subnormal relief. In such areas the soils are high in organic matter and have a very dark-gray or black surface layer over gleyed layers. Such soils are called Humic Gley soils.

Normal relief is that of gently sloping to moderately steep areas. In those areas there is enough moisture to allow climate and living matter to affect the formation of soils to the fullest extent.

Soils in steep areas differ slightly as the result of differences in the direction the slope faces; for example, soils on steep, north-facing slopes differ slightly from soils on steep, south-facing slopes.

Time

Time is necessary for a soil to develop from parent material. In a warm, moist climate, less time is required for the development of a soil than is required in a cool or dry climate. Soils on steep slopes—the Lithosols—are young because erosion has kept pace with the formation of the soils. Soils on flood plains—the Alluvial soils—are young because new materials continually accumulate. The age of soils is reflected by the degree to which the genetic horizons have developed rather than by the years required for the formation of the soil.

Morphology and Classification of the Soils Into Higher Categories

Soils may be classified or grouped in many different ways, for example, by texture, or by suitability for a certain crop. The soils named in this survey have been correlated and fitted into a natural system of soil classification, which was done for two reasons: First, so that any soil in another State or county that is like a given soil in Bath County will have the same name; secondly, so they can be better compared on a national or international scale.

The system of soil classification now used in the United States consists of six categories. These are the order, suborder, great soil group, family, series, and type. The suborder and family categories have never been fully developed and thus will not be discussed in this report.

The soils are first grouped into the lower categories of soil types and soil series. The series are then grouped into great soil groups, which, in turn, are grouped into orders.

The phase is a further subdivision of soils, but it is not an independent category in the scheme. The soil phase is a division of the soil type based on differences in slope, degree of erosion, number and size of stones, or some other feature affecting the use of the soil.

Table 13 lists the soil series by orders and great soil groups and gives some distinguishing characteristics that are important in classification. A detailed description of a profile for each soil type is given in the section "Description of Soils."

Zonal soils

Zonal soils have well-developed, genetically related horizons that reflect the influence of climate and living organisms in their formation. They have strong slopes, are well drained, and have formed in parent material that is not extreme in texture or composition. In Bath County the Gray-Brown Podzolic soils, the Red-Yellow Podzolic soils, and the Sols Bruns Acides are in the zonal order. These soils occupy about 49 percent of the county.

GRAY-BROWN PODZOLIC SOILS

Gray-Brown Podzolic soils formed under deciduous forest in a humid-temperate climate. They have a thin, organic A_0 layer that overlies a thin, dark, organic-mineral layer, or A_1 horizon. Just below the A_1 horizon is a grayish-brown, leached layer, or A_2 horizon, that rests upon brown B horizons. The B horizons contain more clay than the A. Gray-Brown Podzolic soils occupy about 29 percent of the county.

The Beasley, Elk, Lowell, Sees, Shelbyville, and Woolper soils are representative of soils in the Gray-Brown Podzolic great soil group. The Allegheny, Bedford, Nicholson, Eden, Ashton, Cruze, and Sequatchie soils are also in this great soil group, but they have some characteristics of soils in other great soil groups. The representative soils have an organic-mineral A_1 horizon and a bleached A_2 horizon, or they may have a dark-colored, silty A_p horizon instead of an A_1 and A_2. The A horizons in the representative soils are naturally acid and have granular structure. The B horizons are more clayey than the A and have angular or blocky structure.

The Beasley soils have a medium acid B_{21}, a slightly acid B_{22}, a mildly alkaline B_3, and a strongly alkaline C horizon. Their B horizons range from brown to yellowish red in color.

The Elk soils formed in stream alluvium derived from limestone. Their B horizons are slightly acid to medium acid, and their C horizons are medium acid to strongly acid.

The Lowell soils are more sloping than the Shelbyville soils, and their upper B horizons are finer textured. Their pH is variable, especially in the C horizons; the pH of the C horizons ranges from strongly acid to moderately alkaline.

TABLE 13.—*Characteristics and genetic relationships of soil series*

ZONAL SOILS

Great soil group and soil series	Brief profile description	Position	Soil drainage	Slope range	Parent material	Degree of profile development
Gray-Brown Podzolic soils:						
1. Representative—				*Percent*		
Beasley	An A_p horizon of dark yellowish-brown silt loam over a thin, yellowish-brown B_1 horizon of silty clay loam; the B_2 horizon is thin and consists of strong-brown silty clay; it overlies a moderately thick B_3 horizon of light olive-brown to olive clay; a moderately thick C horizon of olive, calcareous clay is at a depth of about 34 inches.	Uplands	Well drained	2 to 30	Material weathered from limestone in upper part, and marl in lower part.	Moderate.
Elk	A moderately thick A_p horizon of dark-brown silt loam over a thin B_1 horizon of dark-brown silt loam; the B_{21} horizon is moderately thick and consists of dark-brown to strong-brown silty clay loam; it overlies a moderately thick B_{22} horizon of yellowish-brown silty clay loam; a moderately thick B_3 horizon of yellowish-brown silty clay loam underlies the B_{22} horizon; a thick C horizon is at a depth of about 48 inches.	Stream terraces.	Well drained	2 to 20	Old stream alluvium washed from soils formed in material weathered from limestone.	Moderate.
Lowell	An A_1 horizon of dark-brown silt loam over a thin to moderately thick B_1 horizon of dark yellowish-brown silty clay loam; below the B_1 horizon is a thin B_2 horizon of yellowish-brown silty clay that overlies a moderately thick B_3 horizon of yellowish-brown clay; the C horizon consists of light olive-brown clay and is at a depth of about 30 inches.	Uplands	Well drained	2 to 50	Material weathered from limestone and siltstone.	Moderate.
Sees	An A_p horizon of very dark grayish-brown silty clay loam over a moderately thick B_2 horizon of mottled olive-brown silty clay; the B_3 horizon is a mottled light olive-brown silty clay; a C horizon of yellowish-brown silty clay is at a depth of about 24 inches.	Foot slopes.	Moderately well drained to somewhat poorly drained.	2 to 12	Colluvium or local alluvium derived from limestone.	Weak.
Shelbyville	A moderately thick A_p horizon of dark-brown silt loam over a thin B_1 horizon of brown silty clay loam; the B_1 horizon is underlain by a thin B_{21} horizon of dark-brown silty clay loam that, in turn, overlies a thin B_{22} horizon of strong-brown silty clay loam; below the B_{22} horizon is a thin, concretionary B_3 horizon; a C horizon of light olive-brown clay is at a depth of about 33 inches.	Uplands	Well drained	2 to 12	Material weathered from interbedded limestone and siltstone.	Moderate to strong.

TABLE 13.—*Characteristics and genetic relationships of soil series*—Continued

ZONAL SOILS—Continued

Great soil group and soil series	Brief profile description	Position	Soil drainage	Slope range	Parent material	Degree of profile development
Gray-Brown Podzolic soils—Continued						
1. Representative—Continued						
Woolper	An A_p horizon of very dark grayish-brown silty clay loam over a thin B_1 horizon of dark-brown silty clay loam; below the B_1 horizon is a thin B_2 horizon of dark-brown silty clay or clay that overlies a B_3 horizon of brown silty clay; a C horizon of brown clay is at a depth of about 42 inches.	Foot slopes.	Well drained	*Percent* 2 to 20	Limestone colluvium or local alluvium.	Weak.
2. With some characteristics of Red-Yellow Podzolic soils—						
Allegheny	An A_p horizon of dark-brown loam over a thick, brown B horizon of fine sandy clay loam to loam; the C horizon is acid, stratified sandy clay loam and is at a depth of about 40 inches.	Stream terraces.	Well drained	2 to 20	Old stream alluvium, chiefly from sandstone and shale.	Moderate.
Bedford	An A_p horizon of brown to dark-brown silt loam over a thin A_2 horizon of dark yellowish-brown silt loam; just below the A_2 horizon is a moderately thick B_2 horizon of yellowish-brown light silty clay loam; a fragipan is at a depth of about 24 inches.	Uplands	Moderately well drained.	0 to 6	Material weathered from limestone.	Strong.
3. With a fragipan—						
Nicholson	A moderately thick A_p horizon of brown to dark-brown silt loam over a moderately thick A_2 horizon of brown silt loam; a moderately thick B_1 horizon of dark yellowish-brown silt loam underlies the A_2 horizon, and below it is a B_2 horizon of yellowish-brown silty clay loam; the fragipan is at a depth of about 32 inches.	Uplands	Well drained to moderately well drained.	0 to 6	Material weathered from limestone, siltstone, and calcareous shale.	Strong.
4. With some characteristics of Lithosols—						
Eden	An A_p horizon of dark grayish-brown silty clay loam over a moderately thick B_2 horizon of light olive-brown silty clay; a very thick C horizon of light olive-brown clay is at a depth of about 12 inches.	Uplands	Somewhat excessively drained.	12 to 50	Material weathered from interbedded limestone, calcareous shale, and siltstone.	Weak.

TABLE 13.—*Characteristics and genetic relationships of soil series*—Continued

ZONAL SOILS—Continued

Great soil group and soil series	Brief profile description	Position	Soil drainage	Slope range	Parent material	Degree of profile development
Gray-Brown Podzolic soils—Continued						
5. With some characteristics of Alluvial soils—						
Ashton	A moderately thick A_p horizon of dark-brown silt loam over a moderately thick B_1 horizon of dark yellowish-brown silt loam; below the B_1 horizon is a moderately thick B_{21} horizon of dark-brown to dark yellowish-brown silty clay loam; underlying the B_{21} horizon is a B_{22} horizon of yellowish-brown silty clay loam; yellowish-brown silty clay is at a depth of about 36 inches.	Foot slopes.	Well drained	*Percent* 2 to 20	Limestone colluvium or local alluvium.	Weak.
Cruze	A thin A_1 horizon of very dark grayish-brown silt loam over a moderately thick A_2 horizon of dark grayish-brown silt loam; below the A_2 horizon is a moderately thick B_1 horizon of dark grayish-brown silt loam that overlies a thick B_2 horizon of dark grayish-brown silty clay loam; below the B_2 horizon is a thin B_{3g} horizon of light brownish-gray silty clay loam; a C horizon of yellowish-red silty clay is at a depth of about 38 inches.	Foot slopes.	Moderately well drained.	2 to 8	Colluvium from black fissile shale.	Weak.
Sequatchie	A moderately thick A_p horizon of dark-brown silty clay loam over a thick B_{21} horizon of yellowish-brown or brown silty clay; below the B_{21} horizon is a moderately thick B_{22} horizon of strong-brown to yellowish-brown silty clay; a C horizon of mottled yellowish-brown silty clay is at a depth of about 32 inches.	Stream terraces.	Well drained	0 to 4	General alluvium, mainly from sandstone and shale but partly from limestone.	Weak.
Red-Yellow Podzolic soils:						
1. Representative—						
Fleming	An A_p horizon of dark reddish-brown or dark-brown silt loam over a thin B_1 horizon of yellowish-red to strong-brown silty clay loam; a moderately thick B_{21} horizon of red to yellowish-red silty clay underlies the B_1 horizon and overlies a moderately thick B_{22} horizon of red to yellowish-red clay; just below is a thin B_3 horizon of yellowish-red clay; a C horizon of greenish-gray clay, variegated with red, is at a depth of about 28 inches.	Uplands	Well drained	6 to 25	Material weathered from limestone in upper part, and clay shale in lower part.	Moderate.

TABLE 13.—*Characteristics and genetic relationships of soil series*—Continued

ZONAL SOILS—Continued

Great soil group and soil series	Brief profile description	Position	Soil drainage	Slope range	Parent material	Degree of profile development
Red-Yellow Podzolic soils—Continued 1. Representative—Continued						
Hagerstown	Moderately thick A_p and A_3 horizons of dark-brown silt loam over a moderately thick B_1 horizon of reddish-brown silty clay loam; a moderately thick B_2 horizon of yellowish-red silty clay underlies the B_1 horizon and overlies a thick B_3 horizon of yellowish-red silty clay; a thick C horizon of red clay is at a depth of about 45 inches.	Uplands	Well drained	*Percent* 0 to 20	Material weathered from dolomitic limestone.	Moderate to strong.
Jefferson	A thin A_1 horizon of dark grayish-brown gravelly silt loam over a thin A_2 horizon of yellowish brown gravelly silt loam; the A_2 horizon overlies a moderately thick B_1 horizon of yellowish-brown gravelly silt loam that, in turn, overlies a thick B_2 horizon of gravelly silty clay loam; just below the B_2 horizon is a moderately thick B_3 horizon of light olive-brown gravelly silty clay loam; a C horizon of gravelly silty clay loam is at a depth of about 48 inches.	Foot slopes.	Well drained	2 to 20	Colluvium or local alluvium from sandstone and shale.	Moderate.
Muse	An A_p horizon of brown silt loam over a thin B_1 horizon of dark-brown silty clay loam; just below the B_1 horizon is a thick B_2 horizon of reddish-brown silty clay loam or silty clay that overlies a thick B_3 horizon of yellowish-red silty clay; a C horizon of variegated clay is at a depth of about 42 inches.	Foot slopes.	Well drained	6 to 20	Colluvium or local alluvium from black fissile shale or clay shale.	Moderate.
Rarden	An A_p horizon of grayish-brown to dark grayish brown silt loam over a thin B_1 horizon of yellowish-brown silty clay loam; just below the B_1 horizon is a thin B_2 horizon of yellowish-red silty clay that overlies a thin B_3 horizon of variegated, red silty clay or clay; a C horizon of variegated, weathered clay shale is at a depth of about 21 inches.	Uplands	Well drained to moderately well drained.	2 to 20	Material weathered from clay shale.	Moderate.
Trappist	An A_p horizon of dark-brown silt loam over a moderately thick B_1 horizon of yellowish-brown silt loam or silty clay loam; just below the B_1 horizon is a thick B_2 horizon of strong-brown silty clay loam; a C horizon of strong-brown silty clay weathered from shale is at a depth of about 31 inches.	Uplands	Well drained	2 to 20	Material weathered from black fissile shale.	Moderate.

TABLE 13.—*Characteristics and genetic relationships of soil series*—Continued

ZONAL SOILS—Continued

Great soil group and soil series	Brief profile description	Position	Soil drainage	Slope range	Parent material	Degree of profile development
Red-Yellow Podzolic soils—Continued						
2. With a fragipan—				*Percent*		
Captina	An A_p horizon of dark yellowish-brown or brown silt loam over a thin B_1 horizon of yellowish-brown silt loam or silty clay loam; just below the B_1 horizon is a B_2 horizon of yellowish-brown silty clay loam; a fragipan is at a depth of about 21 inches.	Stream terraces.	Moderately well drained.	0 to 12	Alluvium derived from limestone.	Strong.
Landisburg	An A_p horizon of dark grayish-brown cherty silt loam over a thin A_2 horizon of light yellowish-brown cherty silt loam; the A_2 horizon is underlain by a moderately thick B_2 horizon of mottled light yellowish-brown cherty silt loam; a cherty fragipan is at a depth of about 16 inches.	Foot slopes.	Moderately well drained to somewhat poorly drained.	2 to 12	Colluvium or local alluvium derived from cherty limestone and shale.	Strong.
Monongahela	A thin A_1 horizon of dark grayish-brown silt loam or fine sandy loam over an A_2 horizon of yellowish-brown or light olive-brown silt loam or fine sandy loam; just below the A_2 horizon is a moderately thick B_1 horizon of yellowish-brown silt loam or fine sandy loam that overlies a moderately thick B_2 horizon of brownish-yellow or olive-yellow sandy clay loam or silty clay loam; the fragipan is at a depth of about 24 inches.	Stream terraces.	Moderately well drained.	0 to 12	General alluvium from sandstone and shale.	Strong.
Tilsit	A thin A_1 horizon of very dark grayish-brown silt loam over a thin A_2 horizon of yellowish-brown to light yellowish-brown silt loam; the A_2 horizon overlies a thin B_1 horizon of yellow silt loam, which overlies a thin B_2 horizon of yellow silt loam; the fragipan is at a depth of about 22 inches.	Uplands	Moderately well drained.	2 to 12	Material weathered from sandstone, shale, or siltstone.	Strong.
3. With some characteristics of Alluvial soils—						
Whitwell	A moderately thick A_p horizon of dark grayish-brown silt loam over a moderately thick B_1 horizon of yellowish-brown silty clay loam; just below the B_1 horizon is a B_2 horizon of mottled light olive-brown silty clay loam that overlies mottled light yellowish-brown silty clay at a depth of about 44 inches.	Stream terraces.	Moderately well drained to somewhat poorly drained.	0 to 2	General alluvium from sandstone, shale, and siltstone.	Weak.

TABLE 13 —*Characteristics and genetic relationships of soil series*—Continued

ZONAL SOILS—Continued

Great soil group and soil series	Brief profile description	Position	Soil drainage	Slope range	Parent material	Degree of profile development
Sols Bruns Acides with some characteristics of Lithosols: Muskingum	A thin A_1 horizon of dark grayish-brown stony silt loam over a thin A_2 horizon of dark yellowish-brown to yellowish-brown silt loam; below the A_2 horizon is a thin BC horizon of yellowish-brown gravelly silt loam that is underlain by a C horizon of yellowish-brown gravelly silt loam to silty clay loam at a depth of about 13 inches.	Uplands	Somewhat excessively drained.	*Percent* 6 to more than 60.	Material weathered from sandstone, shale, and siltstone.	Weak.

INTRAZONAL SOILS

Great soil group and soil series	Brief profile description	Position	Soil drainage	Slope range	Parent material	Degree of profile development
Humic Gley soils: Blago	An A_{1p} horizon of black silt loam over a moderately thick A_{12} horizon of very dark gray silty clay loam; below the A_{12} horizon is a B horizon of gleyed silty clay loam; the C horizon consists of gleyed silty clay and is at a depth of about 21 inches.	Stream terraces.	Very poorly drained.	0 to 4	Alluvium, mainly from sandstone and black fissile shale.	Weak.
Dunning	A moderately thick A_p horizon of black or very dark grayish-brown silty clay loam underlain by a gleyed C horizon.	First bottoms.	Very poorly drained.	0 to 2	Alluvium from argillaceous limestone.	Very weak.
Low-Humic Gley soils: Atkins	Moderately thick A_p horizon of mottled light brownish-gray silt loam or silty clay loam underlain by a gleyed C horizon that ranges from silt loam to silty clay in texture; very strongly acid.	First bottoms.	Poorly drained	0 to 2	Recent alluvium from sandstone, siltstone, and shale.	Very weak.
Melvin	Moderately thick A_p horizon of mottled brown fine silt loam underlain by a gleyed C horizon that ranges from silty clay loam to silty clay in texture; mildly alkaline.	First bottoms.	Poorly drained	0 to 2	Recent alluvium from limestone.	Very weak.
Planosols: 1. With a fragipan - Guthrie	An A_p horizon of mottled grayish-brown to light brownish-gray silt loam over a moderately thick, gleyed B horizon; a fragipan is at a depth of about 16 inches.	Uplands	Poorly drained	0 to 2	Material weathered from limestone.	Strong to moderate.
Johnsburg	A thin A_1 horizon of dark-gray to dark grayish-brown silt loam over a thin A_2 horizon of light yellowish-brown silt loam; below the A_2 horizon is a thin B_1 horizon of mottled yellow to light yellowish-brown silt loam that overlies a moderately thick B_2 horizon of mottled light yellowish-brown silty clay loam; a fragipan is at a depth of about 18 inches.	Uplands	Somewhat poorly drained.	0 to 12	Material weathered from siltstone and shale.	Strong to moderate.

TABLE 13.—*Characteristics and genetic relationships of soil series*—Continued

INTRAZONAL SOILS—Continued

Great soil group and soil series	Brief profile description	Position	Soil drainage	Slope range	Parent material	Degree of profile development
Planosols:						
1. With a fragipan—Continued				*Percent*		
Lawrence	A thin A_1 horizon of very dark grayish-brown silt loam over a thin A_2 horizon of dark yellowish-brown silt loam; below the A_2 horizon is a thin B_1 horizon of mottled light yellowish-brown silt loam that overlies a B_2 horizon; a fragipan is at a depth of about 20 inches.	Uplands	Somewhat poorly drained.	0 to 2	Material weathered from dolomitic limestone.	Strong to moderate.
Mullins	A moderately thick A_p horizon of mottled grayish-brown silt loam over a thin, gleyed B horizon of silt loam; a fragipan is at a depth of about 15 inches.	Uplands	Poorly drained	0 to 2	Chiefly material weathered from shale, but some siltstone and sandstone.	Strong to moderate.
Purdy	A thin A_1 horizon of gray to dark-gray silt loam over an A_2 horizon of light brownish-gray silt loam; below the A_2 horizon is a moderately thick, gleyed B horizon; a fragipan is at a depth of about 15 inches.	Stream terraces.	Poorly drained	0 to 2	Old alluvium from sandstone, siltstone, and shale.	Strong to moderate.
Robertsville	A moderately thick A_p horizon of mottled grayish-brown silt loam over a moderately thick, gleyed B horizon; a fragipan is at a depth of about 18 inches.	Stream terraces.	Poorly drained	0 to 2	Alluvium derived from limestone.	Strong to moderate.
Taft	A moderately thick A_p horizon of light yellowish-brown silt loam over a thin B_1 horizon of mottled pale-brown silt loam; below the B_1 horizon is a thin B_2 horizon of mottled light olive-gray silt loam; a fragipan is at a depth of about 19 inches.	Stream terraces.	Somewhat poorly drained.	0 to 2	Alluvium derived from limestone.	Strong to moderate.
Tyler	A thin A_1 horizon of dark grayish-brown silt loam or fine sandy loam over a moderately thick A_2 horizon of mottled brown silt loam or fine sandy loam; below the A_2 horizon is a thin to moderately thick layer of mottled light yellowish-brown silt loam or fine sandy loam; a fragipan is at a depth of about 16 inches.	Stream terraces.	Somewhat poorly drained.	0 to 2	Alluvium from sandstone and shale.	Strong to moderate.
2. With a claypan—						
Cavode	A moderately thick A_p horizon of dark grayish-brown to grayish-brown silt loam over a thin B_1 horizon of olive-brown silty clay loam; below the B_1 horizon is a moderately thick, clayey B_2 horizon of mottled light olive brown; at a depth of about 19 inches is massive olive-colored clay mottled with gray.	Uplands and foot slopes.	Somewhat poorly drained.	0 to 12	Material weathered from acid clay shale or colluvium from acid clay shale.	Moderate.

TABLE 13.—*Characteristics and genetic relationships of soil series*—Continued

INTRAZONAL SOILS—Continued

Great soil group and soil series	Brief profile description	Position	Soil drainage	Slope range	Parent material	Degree of profile development
Rendzinas:				*Percent*		
Fairmount	An A_p horizon of dark-gray to very dark grayish-brown flaggy silty clay loam over a thin B horizon of dark yellowish-brown flaggy clay; a thin C horizon of light olive-brown or olive-gray, calcareous clay is at a depth of about 12 inches.	Uplands	Somewhat excessively drained.	6 to 60	Material weathered from thin-bedded, argillaceous limestone.	Weak.
Otway	An A_p horizon of very dark grayish-brown silty clay over a moderately thick B_2 horizon of yellowish-brown, moderately alkaline silty clay or clay; a C horizon of variegated, calcareous clay is at a depth of about 18 inches; the C horizon is commonly less clayey with increasing depth.	Uplands	Somewhat excessively drained.	6 to 50	Material weathered from soft shale.	Weak.
Solodized-Solonetz:						
Shrouts	A thin A_p horizon of dark grayish-brown silty clay loam over a thin B_2 horizon of olive-gray clay with light olive-brown variegations and strong, prismatic structure; variegated, gray and olive, alkaline, weakly calcareous clay is at a depth of about 14 inches.	Uplands	Somewhat excessively drained.	6 to 30	Material weathered from weakly calcareous clay shale.	Moderate to weak.

AZONAL SOILS

Great soil group and soil series	Brief profile description	Position	Soil drainage	Slope range	Parent material	Degree of profile development
Alluvial soils:						
1. Representative—						
Egam	An A_p horizon of dark-brown silty clay loam underlain by a C horizon of dark-brown to very dark grayish-brown silty clay that is mottled with gray at a depth below about 20 inches; neutral to moderately alkaline.	First bottoms.	Well drained to moderately well drained.	0 to 2	Recent alluvium, chiefly from limestone.	Very weak.
Huntington	An A_p horizon of dark-brown to very dark grayish-brown silt loam underlain by a C horizon of dark-brown silt loam; slightly acid to mildly alkaline.	First bottoms.	Well drained	0 to 2	Recent alluvium derived from limestone.	Very weak.
Lindside	An A_p horizon of dark-brown silt loam underlain by a C horizon of brown to dark-brown silt loam that is mottled with gray below a depth of about 20 inches; slightly acid to mildly alkaline.	First bottoms.	Moderately well drained.	0 to 2	Recent alluvium derived from limestone.	Very weak.
Philo	An A_p horizon of dark grayish-brown silt loam underlain by a C horizon of olive-brown silt loam that is mottled with gray below a depth of about 20 inches; strongly acid.	First bottoms.	Moderately well drained.	0 to 2	Recent alluvium derived from sandstone, siltstone, and shale.	Very weak.

TABLE 13.—*Characteristics and genetic relationships of soil series*—Continued

AZONAL SOILS—Continued

Great soil group and soil series	Brief profile description	Position	Soil drainage	Slope range	Parent material	Degree of profile development
Alluvial soils—Con.						
1. Representative—Continued						
Pope	An A_p horizon of dark grayish-brown silt loam or fine sandy loam underlain by a C horizon of brown to yellowish-brown silt loam; strongly acid.	First bottoms.	Well drained	*Percent* 0 to 2	Recent alluvium derived from sandstone, siltstone, and shale.	Very weak.
2. With some characteristics of Low-Humic Gley soils						
Newark	A moderately thick A_p horizon of dark grayish-brown silt loam over a C horizon of mottled dark grayish-brown or olive-brown silt loam; the C horizon is gray below a depth of about 19 inches; neutral.	First bottoms.	Somewhat poorly drained.	0 to 2	Recent alluvium derived from limestone.	Very weak.
Stendal	An A_p horizon of dark grayish-brown or olive-brown silt loam underlain by a C horizon of mottled olive-brown silt loam that is gray at a depth below about 16 inches; very strongly acid.	First bottoms.	Somewhat poorly drained.	0 to 2	Recent alluvium derived from sandstone, siltstone, and shale.	Very weak.
Lithosols:						
Colyer	A very thin A_1 horizon of grayish-brown shaly silt loam over a thin A_3 horizon of light yellowish-brown shaly silt loam; a moderately thick C horizon of weathered shale is at a depth of about 6 inches.	Uplands	Somewhat excessively drained.	12 to 60	Material weathered from black fissile shale.	Weak.
Rockcastle	A very thin A_1 horizon of very dark grayish-brown silt loam over a thin A_2 horizon of yellowish-brown silt loam; below the A_2 horizon is a BC horizon of variegated, yellowish-brown and strong-brown silty clay that overlies weathered clay shale at a depth of about 13 inches.	Uplands	Somewhat excessively drained.	12 to 50	Material weathered from clay.	Weak.

The Sees soils have weakly developed genetic horizons, and the soil material below the surface horizon is mottled. These soils are slightly less well drained than the typical Gray-Brown Podzolic soils. Their A_p horizon is slightly acid, their B horizons are neutral to mildly alkaline, and their C horizons are mildly alkaline.

The Woolper soils are dark colored because they formed in colluvium washed from Rendzina soils. The process of calcification that caused the Rendzina soils to be dark colored continued to some extent in the Woolper soils. The B horizons and the upper C horizons of the Woolper soils are mildly alkaline. The lower C horizons are moderately alkaline.

The Allegheny and Bedford soils are in the Gray-Brown Podzolic great soil group, but they have some characteristics of Red-Yellow Podzolic soils. The Allegheny soils formed in old, mixed alluvium derived chiefly from sandstone and shale, but partly from limestone. The Bedford soils formed in material weathered from limestone. The B horizon of the Allegheny and Bedford soils is strongly acid to extremely acid, and their C horizons are very strongly acid to extremely acid.

The Nicholson soils are also not true Gray-Brown Podzolic soils, because they have a fragipan. They are moderately well drained to well drained. Their B horizons are mildly alkaline. In places there is a thick, anthropic A horizon.

The Eden soils have some characteristics of Lithosols. They have stronger slopes than the typical Gray-Brown Podzolic soils. They also have thin, clayey B horizons that are variegated light olive brown, and their solum is rather thin.

The Ashton, Cruze, and Sequatchie soils are in the Gray-Brown Podzolic great soil group, but they have only weakly developed B horizons, a characteristic of Alluvial soils. The Ashton and Cruze soils are on low foot slopes. The Ashton soils are better drained than the Cruze, and they have a slightly lighter colored surface layer. They also lack the grayish color below a depth of about 30 inches that is typical of the Cruze soils. The Sequatchie soils are on low stream terraces. They are subject to infrequent flooding.

RED-YELLOW PODZOLIC SOILS

Red-Yellow Podzolic soils have a thin, organic A_0 layer that overlies an organic-mineral A_1 horizon (*11*). Just below the A_1 horizon is a grayish-yellow or yellowish-brown, leached A_2 horizon that rests upon illuviated red or yellow B horizons. Red-Yellow Podzolic soils occupy about 12 percent of the county.

The Fleming, Hagerstown, Jefferson, Muse, Rarden, and Trappist soils are representative of the soils in the Red-Yellow Podzolic great soil group. The Fleming soils have a dark-brown or dark reddish-brown A_p horizon of silt loam over a red or yellowish-red B horizon of silty clay. The B horizon has strong blocky structure and overlies variegated olive clay. The B horizon is strongly acid. The C horizon, in most places, is strongly acid, but in places the lower part of it is alkaline.

The Hagerstown soils have a moderately thick, dark-brown, granular surface layer. They have an A_3 horizon rather than an A_2. Their B horizons are silty clay, and their C horizons are mottled red and strong-brown clay.

The Jefferson soils formed in colluvium or local alluvium, chiefly from acid sandstone and shale. They have a thin, organic-mineral A_1 horizon and a light-colored or bleached A_2 horizon. Their B_2 horizons are slightly more clayey than the A and are yellowish brown (10YR 5/6 to 5/8). Their parent material is streaked or mottled with red, yellow, brown, or gray. The B and C horizons of the Jefferson soils are very strongly acid.

The Muse, Rarden, and Trappist soils formed in material weathered from acid shale. They have fine-textured, plastic B horizons that range from strong brown to red in color. Typically, their C horizons have coarse, reticulate variegations of red, yellow, brown, and light gray. The B and C horizons are strongly acid to extremely acid.

The Captina, Landisburg, Monongahela, and Tilsit soils are Red-Yellow Podzolic soils that have a fragipan. Except for the Landisburg soils, which are moderately well drained to somewhat poorly drained, all of these soils are moderately well drained. The Captina soils have a strongly acid B_2 horizon, but the rest of the soils have a very strongly acid B_2 horizon and a very strongly acid or extremely acid fragipan.

The Whitwell soils are Red-Yellow Podzolic soils that have some characteristics of Alluvial soils. They are on low stream terraces and are subject to occasional overflow. These soils are moderately well drained to somewhat poorly drained. They have a mottled, light olive-brown B_2 horizon.

SOLS BRUNS ACIDES

In the Sols Bruns Acides great soil group are soils of the Muskingum series. Typically, Sols Bruns Acides have a thin A_1 horizon and a faint to evident A_2 horizon. The B horizon contains but little more clay or no more clay than the horizons that lie above and below it. This horizon is distinguished chiefly by color; it is redder in hue or of higher chroma than either the A or C horizons. Sols Bruns Acides have a very low degree of base saturation, and most of them are very strongly acid.

The Muskingum soils in Bath County, although classified as in the Sols Bruns Acides great soil group, have some properties of Lithosols because they are relatively shallow over siltstone, sandstone, and shale. They also have a relatively thin, yellowish-brown BC horizon instead of the thicker, brown B horizon that is typical of soils of the Sols Bruns Acides great soil group. These soils occupy about 8 percent of the county.

Intrazonal soils

Intrazonal soils have genetically related horizons that reflect the dominating influence of some local factor of relief or parent material over the normal influences of climate and living matter in the soil-forming processes. In Bath County the Humic Gley soils, Low-Humic Gley soils, Planosols, Rendzinas, and solodized-Solonetz soils are in the intrazonal order. Intrazonal soils occupy about 29 percent of the county.

HUMIC GLEY SOILS

Humic Gley soils formed under very wet conditions, mainly in swamps or marshes. They are very poorly drained and have a moderately thick or thick, dark-colored, organic-mineral surface layer, or A_1 horizon. Below the surface layer are gleyed horizons. In Bath County the Blago and Dunning soils are representative of the soils in the Humic Gley great soil group. These soils occupy about 3 percent of the county.

The Blago and Dunning soils have moderately thick, very dark colored A horizons that overlie gleyed horizons. The Blago soils are acid, but the Dunning soils are neutral to alkaline.

LOW-HUMIC GLEY SOILS

Low-Humic Gley soils formed in areas where drainage was poor. They are poorly drained and have a light-colored surface layer or A_p horizon that is medium to low in organic matter. Below the surface layer are gray and brown, gleyed mineral horizons. In Bath County the Atkins and Melvin soils are representative of the Low-Humic Gley soils. They occupy about 2 percent of the county.

The Atkins and Melvin soils are young soils that formed on first bottoms from recent stream alluvium. They are poorly drained and have a mottled surface layer or A_p horizon over gleyed C horizons.

The Atkins soils formed in acid material, and they are naturally strongly acid to very strongly acid. The Melvin soils formed in alluvium washed from soils of limestone origin, and they are slightly acid to mildly alkaline.

PLANOSOLS

The Planosols are somewhat poorly drained to poorly drained and are on nearly level or slightly undulating uplands and stream terraces. These soils have an eluviated A horizon. Their B horizon consists of one or more layers that contain accumulated clay. These layers have been cemented or compacted and contrast sharply with the horizons above and below. In Bath County the Guthrie,

Johnsburg, Lawrence, Mullins, Purdy, Robertsville, Taft, and Tyler soils are Planosols that have a fragipan. The Cavode soils are Planosols that have a claypan. Planosols occupy approximately 6 percent of the county.

The Guthrie, Mullins, Purdy, and Robertsville soils are all poorly drained and have strong to moderate horizon development. They have mottled, leached A horizons that overlie a gleyed, upper B horizon. A fragipan is at a depth of about 15 to 20 inches.

The Johnsburg, Lawrence, Taft, and Tyler soils are similar to the Guthrie, Mullins, Purdy, and Robertsville, but they have slightly better drainage and mottled, rather than gleyed, upper B horizons.

The Guthrie, Lawrence, Robertsville, and Taft soils formed in material weathered from limestone, but they have strongly acid upper B horizons and a very strongly acid fragipan. The Johnsburg, Mullins, Purdy, and Tyler soils formed in acid material. Their B horizons and fragipan are extremely acid.

The Cavode soils are somewhat poorly drained. They have a gleyed, clayey B horizon.

RENDZINAS

The Rendzinas formed as the result of calcification in which excess calcium in the soil combined with organic matter. They have very dark grayish-brown to black, strongly granulated A horizons, underlain by gray, olive-gray, or pale-yellow, soft, calcareous material. In Bath County the Fairmount and Otway soils are in this great soil group. These soils occupy approximately 20 percent of the county.

The Fairmount and Otway soils have a very dark colored, granular, mildly alkaline surface layer over thin, calcareous, clayey B horizons. The C horizon is calcareous. The Fairmount and Otway soils differ primarily in that the Fairmount soils are underlain by limestone, and the Otway soils, by calcareous clay or marl.

SOLODIZED-SOLONETZ SOILS

Solodized-Solonetz soils have a thin, grayish-brown or dark grayish-brown surface layer over a thin, gray, slightly acid to moderately alkaline B_2 horizon. The B_2 horizon has prismatic structure and is underlain by a moderately alkaline C horizon. In the C horizon the amount of exchangeable sodium or sodium plus magnesium is greater than that of calcium plus hydrogen.

The Shrouts soils are representative of the solodized-Solonetz soils in Bath County. They have a thin surface layer of dark grayish-brown silty clay loam over a slightly acid to mildly alkaline B_2 horizon. The B_2 horizon has prismatic structure. It is underlain by a moderately alkaline (pH 8.1 to 8.4) or weakly calcareous C horizon.

Azonal soils

Azonal soils are young and do not have distinct, genetically related horizons. Because of their youth, conditions of parent material, or excessive relief, the normal soil profile characteristics have not had a chance to develop. In Bath County the Alluvial soils and Lithosols are in the azonal order. They occupy approximately 29 percent of the county.

ALLUVIAL SOILS

The Alluvial soils are composed of transported and relatively recently deposited material that has had little or no modification of the original material by soil-forming processes. In Bath County the Egam, Huntington, Lindside, Philo, and Pope soils are representative of this great soil group. The Newark and Stendal soils are also in this great soil group but have some characteristics of Low-Humic Gley soils. The Alluvial soils occupy approximately 9 percent of the county.

The Alluvial soils have a brown to dark-brown A_p horizon. That horizon overlies C horizons that vary little from the surface layer, other than in color. The differences in color were caused by slight differences in drainage or were the result of staining by organic matter.

The Egam soils are fine textured and are moderately well drained to well drained. They formed in alluvium washed from soils that developed in material weathered from argillaceous limestone or soft, calcareous shale. The Huntington and Pope soils are well drained, and the Lindside and Philo soils are moderately well drained. The Huntington and Lindside soils formed in material washed from soils that originated from limestone, and they are slightly acid to moderately alkaline. The Philo and Pope soils formed in acid material, and they are naturally strongly acid.

The Newark and Stendal soils are somewhat poorly drained. They have a mottled surface layer or A_p horizon. The C horizon is gleyed below a depth of about 16 inches.

The Newark soils formed in alluvium derived from limestone, and they are slightly acid to mildly alkaline. The Stendal soils formed in acid alluvium, and they are naturally strongly acid to very strongly acid.

LITHOSOLS

Lithosols are an azonal group of soils that have an incomplete solum, or no clearly expressed soil morphology. They consist of freshly and imperfectly weathered masses of hard rock or of fragments of hard rock, and they formed in areas of steep relief. In Bath County the Colyer and Rockcastle soils are Lithosols. These soils occupy approximately 12 percent of the county.

The Rockcastle and Colyer soils generally have a surface layer that directly overlies a C horizon. In places, however, there is a thin, discontinuous B horizon that is weakly developed. The Rockcastle soils formed in material weathered from clay shale, but their development was impeded as the result of slow permeability. The Colyer soils formed in material weathered from black fissile shale, and they are somewhat darker colored and lighter textured than the Rockcastle soils.

General Nature of the Area

This section gives facts about the physiography, geology, relief, drainage, and climate of the county. It also gives facts about the history and development, community facilities, industries, and agriculture.

Physiography, Geology, Relief, and Drainage

Bath County lies in four major physiographic divisions of Kentucky. About 55 percent of it, or most of the northwestern part and all of the central part, is in the Outer Bluegrass. An additional 4 percent is in the Eden Hills, which occurs in a spotty pattern along the north-

western boundary of the county. Approximately 17 percent is in the Knobs area, and about 24 percent is in the Escarpments, or mountainous area, along the southeastern boundary of the county. These physiographic divisions are discussed in the section "General Soil Map."

The rocks that underlie the Outer Bluegrass and the Eden Hills are of the Ordovician geologic period. Rocks of the Silurian, Devonian, and Mississippian periods underlie the Knobs, and rocks of the Pennsylvanian period underlie the mountainous area. A cross section of the county, showing the rock formations and their relation to the soils, is shown in the section "Formation, Morphology, and Classification of Soils."

The relief of the county ranges from level to very steep. It is closely related to the geologic formations and to the kinds of soils. The southeastern one-fourth of the county is almost mountainous. In that area the elevation of the valley floors and the narrow ridgetops changes from 500 to 600 feet within a short distance. There is little karst topography in the county, and it is only in the western part where the Shelbyville and Lowell soils occur. In the Knobs are flat areas where there is subnormal relief and the water table is fluctuating. The highest point in the county, Tator Knob, is 1,388 feet above sea level. The lowest point is about 580 feet above sea level. It is on the Licking River at the point where Nicholas, Fleming, and Bath Counties meet. Owingsville, near the geographical center of the county, is about 1,000 feet above sea level.

The entire county lies within the watershed of the Licking River, which drains into the Ohio River. The second largest stream in the county, Slate Creek, flows approximately north through the central part of the county and empties into the Licking River. Most of the soils on first bottoms along Slate Creek are well drained to moderately well drained. Salt Lick Creek, a third large stream, flows northward across the eastern corner of the county and empties into the Licking River at Salt Lick. The stream channel of Salt Lick Creek is meandering and shallow. Intensive drainage is necessary if crops are to be grown on many of the soils on bottoms along that stream.

Climate

The climate of Bath County is humid temperate. Temperatures are moderate during most of the year, but there are short periods of hot weather in summer and short periods of cold weather in winter. The average annual precipitation is about 48 inches. It includes about 19 inches of snow, but the snow usually does not remain on the ground for more than 3 or 4 days at a time. Table 14 compiled from the records of the U.S. Weather Bureau at Mount Sterling, Ky., in the adjoining Montgomery County, gives data that are typical for this county.

The average annual temperature of the county is 55° F. January is the coldest month, and July, the warmest. Farmers can work outdoors during most of the year. On a few farms livestock are fed outside throughout the entire year.

The prevailing winds are from the west and southwest, and they bring in moisture from the Gulf of Mexico. Rainfall is usually adequate during the planting season; it has been heavy enough at times to cause severe damage to crops when bottom lands were flooded or the level soils in the uplands were ponded. In 1953, 1954, and 1957, there were periods of drought when yields were materially reduced because of inadequate rainfall during the growing season. Local hailstorms and windstorms are common late in summer. As a result, some crops, especially tobacco, are seriously damaged at times.

TABLE 14.—*Temperature and precipitation at Mount Sterling, Montgomery County, Ky.*

[Elevation, 930 feet]

Month	Temperature [1]			Precipitation [2]			
	Average	Absolute maximum	Absolute minimum	Average	Driest year (1930)	Wettest year (1909)	Average snowfall
	° F	° F	° F	Inches	Inches	Inches	Inches
December	35.4	74	−18	3.94	1.07	3.71	4.0
January	33.4	80	−19	4.42	3.90	4.06	5.8
February	34.6	80	−22	3.62	3.18	9.43	5.4
March	44.6	89	0	5.15	2.59	5.04	3.2
April	54.3	92	18	4.12	1.32	7.85	.3
May	64.3	98	30	4.13	2.72	9.51	0
June	72.9	103	39	4.63	1.05	6.95	0
July	76.4	109	42	4.94	1.57	7.33	0
August	74.8	105	43	4.06	3.22	6.05	0
September	68.8	103	25	3.02	2.43	5.74	0
October	56.5	94	18	2.78	1.18	2.26	.1
November	44.4	83	−8	3.42	1.48	2.41	.7
Year	55.0	109	−22	48.23	25.71	70.34	19.5

[1] Average temperature based on a 63-year record, through 1955; highest and lowest temperatures based on a 54-year record, through 1952.

[2] Average precipitation based on a 66-year record, through 1955; wettest and driest years based on a 52-year record, in the period 1889–1955; snowfall based on a 44-year record, through 1952.

The average frost-free season is 188 days. It extends from April 20, the average date of the last killing frost in spring, to October 26, the average date of the earliest frost in fall. During the last 20 years, killing frosts have occurred as late as May 10 and as early as September 28. Crops on north-facing slopes have been less damaged by frost than those on south-facing or west-facing slopes because their growth was retarded until late in spring.

The climate of Bath County is favorable for the growth of corn, tobacco, small grains, and many kinds of grasses, and it is also favorable for soybeans and many other kinds of legumes. Usually, moisture conditions in fall are favorable for the preparation of the seedbed and for germination of seed, although germination is retarded in some fall seasons because the soil is dry. Cotton does not grow well, because the growing season is too short and the average temperature too low. The length of the growing season, the mild temperature, and the favorable distribution of rainfall, however, are particularly well suited to the production of white burley tobacco.

Wheat, rye, and other fall-sown grains can be grown in winter in this county. They survive well if they are seeded early, and they may furnish limited grazing for livestock during part of the winter. Kentucky 31 fescue, various kinds of clover, and other perennial pasture plants make some growth during the winter months.

History and Development

The first permanent settlement in what is now Bath County was started in 1775 along Slate Creek near the place where the old iron furnace is now located. Later, other settlers, mainly from Virginia and Pennsylvania, came into the area. Bath County, so named because of the numerous springs in the county, was formed from a part of Montgomery County on January 13, 1811. In 1869, the southern part of the original county was combined with Menifee County, but since that time the boundaries of Bath County have remained the same.

Owingsville, the county seat, was surveyed and laid out in October 1811. Other small towns that were established later are Sharpsburg, Bethel, and Salt Lick.

Community Facilities

Schools and churches are conveniently located throughout the county. There are approximately 38 churches of various denominations. Three doctors and one dentist are located in the county, but there is no hospital.

Most farms have electricity. Telephone communication is available to most of the county, except the southern part, but in 1960 only 293 of the 1,337 farm homes had telephones. Rural mail delivery routes serve all parts of the county.

Industries

After the Civil War and before 1910, stripmining of iron ore and lumbering were the major industries in this county. Several iron companies were located in the county, and four iron furnaces were in operation at various times. Millions of board feet of virgin timber were clear cut in the southern and eastern parts of the county and were floated to market on the Licking River.

Now, agriculture is the principal occupation in the county. There are no large industrial plants, but two small lumber and pallet plants and one flooring plant where oak and pine flooring is manufactured are located in the county. In some areas rural families depend on industries located in surrounding counties for their livelihood.

Agriculture

Agriculture has always been important in Bath County. In 1959, there were 1,337 farms[4] in the county. These occupied 72.5 percent of the acreage, or 133,085 acres. Field crops were the main source of farm income on many of the farms, but there were also 25 poultry farms, 55 dairy farms, and 158 livestock farms other than poultry and dairy.

The farms vary greatly in size, but most of them are small. The average-sized farm in 1959 was 99.5 acres, but 41.4 percent of the farms were less than 50 acres in size. Only 10 percent were larger than 220 acres.

Of the land in farms in 1959, 18.4 percent consisted of land from which crops were harvested, 50.9 percent was rotation pasture, and 2.2 percent was land not pastured and from which crops were not harvested. In addition, 10.8 percent of the land in farms was permanent pasture, 5.1 percent was woodland that was pastured, and 8.1 percent was woodland not pastured. The rest consisted mainly of house lots, roads, and wasteland. The following gives the acreage in the various uses in 1959:

	Acres
Cropland harvested	24, 484
Cropland used for rotation pasture	67, 736
Cropland not harvested and not pastured	3, 001
Woodland pastured	6, 805
Other pasture (not cropland and not woodland)	14, 356
Other land, including house lots, roads, and wasteland	5, 933

On most of the farms, feed is grown for livestock and garden crops are grown for home use. In 1959, field crops accounted for approximately 58 percent of the income derived from the sale of farm products. The chief field crops were corn, tobacco, alfalfa, red clover, and Korean lespedeza, but small grains were grown on a small acreage. Corn occupied approximately 38 percent of the acreage of crops harvested in 1959, and hay crops, about 46 percent. Tobacco was grown on a comparatively small acreage, or on only 13 percent of the total acreage of crops harvested, but it was the main cash crop in the county. The following shows the acreage of the principal crops grown in the county in 1959:

	Acres
Corn harvested	9, 246
Clover cut for hay	4, 622
Lespedeza cut for hay	2, 899
Alfalfa cut for hay	2, 256
Other hay cut	1, 382
Tobacco harvested	3, 160
Small grains	818
Other crops	101

Livestock provides an important source of income in the county. In 1959, 30 percent of the total farm income from the sale of farm products was derived from the sale of livestock and livestock products other than poultry and dairy products. Dairy products accounted for an additional 8 percent, and poultry and poultry products accounted for about 4 percent.

In 1959, approximately 53 percent of the farms were operated by the owner, and tenants operated about 33 percent. The rest were operated by part owners.

Agricultural Agencies

In the early days of agriculture in the county, little was done to maintain the fertility of the soils or to protect them from erosion. Land was cheap, and for a few years high yields were obtained on the virgin land. When the original supply of plant nutrients in the soils was depleted, however, and when erosion became a problem, the need for building up and maintaining the soils became apparent. Various agricultural agencies helped in the attempt to find better methods of farming. One of these was the Agricultural Extension Program, started in 1927. Under this program ways were taught and demonstrated to improve the soils by using better management practices.

The first Vocational Agricultural Department in the county was opened in the high school at Owingsville in 1940, and later a similar department was opened in the high school at Sharpsburg. The curriculum at both places consisted of courses in soils, soil judging, and water management. It also included practical experience in producing crops and conserving soil and water.

[4] The statistics used in this section were taken from records of the U.S. Bureau of the Census.

The Agricultural Conservation Program of the Federal Government has helped pay for many practices needed to build up and conserve the soils. The Farm Home Administration has also been instrumental in making loans and providing guidance to the farmers.

In June 1946, the Bath County Soil Conservation District was organized. This soil survey is part of the technical assistance furnished by the Soil Conservation Service to the Bath County Conservation District.

Glossary

[Most of the definitions in this Glossary were taken from Soils and Men (*13*), Soil (*15*), or the Soil Survey Manual (*14*).]

Alluvium. Fine material, such as sand, silt, or clay, deposited on land by streams. Local alluvium consists of sediments that have been carried by small streams that flow out of tiny drainage basins, or nearly homogeneous rock and soil material and are deposited at the base of slopes. General alluvium is of mixed origin, as that along the course of major streams. Recent alluvium consists of sediments that have been recently deposited by streams.

Acidity. See Reaction.

Available moisture capacity. The amount of moisture a soil can hold that is available to the roots of plants. This is approximately the amount of moisture held between one-third atmosphere and 15 atmospheres of tension.

Bedrock. The solid rock that underlies soils and other earthy surface formations.

Calcareous soil. A soil that contains calcium carbonate (lime), or a soil alkaline in reaction because of the presence of calcium carbonate. A soil that contains enough calcium carbonate to effervesce (fizz) when treated with dilute hydrochloric acid.

Chert. Commonly called flint in Bath County. A structureless form of silica, closely related to flint, that breaks to angular fragments. Soils developed from impure limestone containing fragments of chert and having large quantities of these fragments in the soil mass are called cherty soils.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter (0.000079 inch) in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Colluvium. Mixed deposits of soil material and fragments of rock near the base of rather steep slopes. The deposits have accumulated through soil creep, slides, and local wash.

Concretions. Hard grains, pellets, or nodules from concentrations of compounds in the soil that cement the soil grains together. The composition of some concretions is unlike that of the surrounding soil. Concretions can be of various sizes, shapes, and colors.

Consistence, soil. The properties of soil material that determine its resistance to crushing and its ability to be molded or changed in shape. The following terms are commonly used to describe consistence:

Firm. When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Friable. When moist, crushes easily under gentle to moderate pressure between thumb and forefinger, and coheres when pressed together.

Plastic. When wet, forms a wire or spindle when rolled between thumb and forefinger; readily deformed by moderate pressure, but can be pressed into a lump.

Sticky. When wet, adheres to other material.

Contour farming. Planting, cultivating, and harvesting on the contour, or at right angles to the direction of slope.

Contour stripcropping. Alternating strips of row crops with strips of sod crops. The rows are run on the contour, or at right angles to the direction of slope.

Cover crop. Grasses, legumes, small grains, or other close-growing crops grown primarily for the purpose of protecting and improving the soil between periods of regular crop production. A cover crop is also grown between trees and vines in orchards and vineyards.

Cropland. Land regularly used for crops, except forest crops and permanent pasture. It includes rotation pasture, cultivated summer fallow, and land ordinarily used for crops, but temporarily idle.

Crop residue use. Using the part of a crop that is left in the field after harvest, by leaving it on the surface, or by plowing it into the surface layer. The crop residue protects the soil during that part of the year when losses from erosion are the most critical, and it helps conserve moisture.

Diversion channel. A channel that has a supporting ridge on the lower side. It is constructed across the slope to divert runoff so that water will flow around the slope to an outlet without causing erosion, or to prevent excess water from flowing onto lower lying areas.

Drainage, natural. Conditions of drainage that existed during the development of the soil, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation. The following terms are used to express natural drainage:

Excessively drained. Water is removed from the soil very rapidly.

Somewhat excessively drained. Water is removed from the soil rapidly.

Well drained. Water is removed readily, but not rapidly, from the soil. A well-drained soil has good drainage.

Moderately well drained. Water is removed from the soil somewhat slowly so that the profile is wet for a small, but significant part of the time.

Somewhat poorly drained. Water is removed slowly enough to leave the soil wet for significant periods, but not all of the time.

Poorly drained. Water is removed so slowly that the soil remains wet much of the time. The water table is commonly at or near the surface during a large part of the year.

Very poorly drained. Water is removed from the soil so slowly that the water table remains at or on the surface the greater part of the time. Soils of this class are frequently ponded.

Erosion, soil. The wearing away of the surface of the land by detachment and transport of soil and rock materials through the action of wind, water, or other geologic processes. *Accelerated erosion* refers to the loss of soil material brought about through the activities of man. In this report, *erosion* means accelerated erosion, and *geologic erosion* refers to the natural erosion by geologic forces.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flood plain. The nearly level land along streams that overflow during floods.

Fragipan. A dense and brittle pan or layer in soils that owes its hardness mainly to extreme density or compactness rather than to a high content of clay or cementation. The fragments that are removed are friable, but the material in place is so dense that roots cannot penetrate it, and water moves through it very slowly because of the small size of the pores.

Green-manure crop. Any crop grown for the purpose of being turned under while green or soon after maturity to improve the soil.

Gully erosion. Removal of soil by running water. Channels are formed that cannot be smoothed out completely by normal cultivation. See also Erosion, soil.

Horizon, soil. A layer of soil, approximately parallel to the surface of the soil, that has distinct characteristics produced by soil-forming processes.

A horizon. The master horizon consisting of (1) one or more mineral horizons that have the maximum accumulation of organic matter; (2) a surface or subsurface horizon that is lighter in color than the underlying horizon and has lost clay minerals, iron, and aluminum with resultant concentration of the more resistant minerals; or (3) horizons that belong to both of these categories.

B horizon. The master horizon of altered material characterized by (1) an accumulation of clay, iron, or aluminum, and accessory organic material; or (2) more or less blocky or prismatic structure together with other characteristics, such as stronger colors that are unlike those of the A horizon or those of the underlying horizons of nearly unchanged material; or (3) characteristics of both of these categories.

C horizon. A layer of unconsolidated material, relatively little affected by the influence of organisms and presumed to be similar in chemical, physical, and mineralogical composition to the material from which at least a part of the overlying B and C horizons have developed.

D horizon. Any stratum underlying the C horizon, or the B horizon if no C is present, that is unlike the material from which the solum developed.

Humus. The well-decomposed, more or less stable part of the organic matter in a mineral soil.

Internal drainage. The movement of water through the soil profile.

Leaching, soil. The removal of materials in solution by the passage of water through the soil.

Liquid limit (engineering). The moisture content at which a soil material passes from a plastic to a liquid (free-flowing) state.

Marl. An earthy, crumbly deposit consisting chiefly of calcium carbonate mixed with clay or other soil material in varying proportions.

Moisture density. The density to which a soil can be compacted with various moisture contents and forces of compaction. The greatest density obtained in the test is termed "maximum density," and the corresponding moisture content is termed "optimum moisture."

Moisture-supplying capacity. The relative capacity of the soil to take in and supply moisture in amounts favorable to most plants. It is related to the amount of runoff, the rate of infiltration, the available water-holding capacity, the depth of the root zone, and the average moisture-extraction pattern.

Morphology, soil. The constitution of the soil, including the texture, structure, consistence, color, and other physical, chemical, and biologic properties of the various horizons that make up the soil profile.

Mottling, soil. Patches of contrasting color that vary in number and size. Descriptive terms for mottling are as follows: Contrast—*faint*, *distinct*, and *prominent:* abundance—*few*, *common*, and *many;* and size—*fine*, *medium*, and *coarse*. The size measurements are as follows: *Fine*, commonly less than 5 millimeters (about 0.2 inch) across the greatest dimension; *medium*, commonly from 5 to 15 millimeters (about 0.2 to 0.6 inch) across the greatest dimension; and *coarse*, commonly more than 15 millimeters (about 0.6 inch) across the greatest dimension.

Mulching. Applying plant residues or other suitable material on the surface of the soil. This material helps conserve moisture and control temperature, prevents the surface soil from compacting and crusting, helps reduce runoff and erosion, improves the structure of the soil, and helps control weeds.

Nutrient, plant. Any element taken in by a plant, essential to its growth, and used by it in the elaboration of its food and tissue. Among the elements obtained from the soil are nitrogen, phosphorus, calcium, potassium, magnesium, sulfur, iron, manganese, copper, boron, and zinc. Plant nutrients obtained largely from the air and water are carbon, hydrogen, and oxygen.

Parent material. The unconsolidated mass of rock material (or peat) from which the soil profile develops. See also Horizon, soil; Profile, soil; Substratum.

Permanent pasture. Pasture that occupies the soil for a long time, in contrast to rotation pasture, which occupies the soil for only 1 or 2 years in a rotation cycle with other crops.

Permeability, soil. The quality of a soil that enables water or air to move through it. Classes of permeability are: *Very slow*, *slow*, *moderately slow*, *moderate*, *moderately rapid*, *rapid*, and *very rapid*.

pH. A term used to indicate the acidity or alkalinity of a soil. A pH of 7.0 indicates precise neutrality, higher values indicate increasing alkalinity, and lower values indicate increasing acidity. See also Reaction.

Plastic limit (engineering). The moisture content at which a soil changes from a semisolid to a plastic state.

Plasticity index (engineering). The numerical difference between the liquid limit and the plastic limit; the range in moisture content over which the soil remains plastic.

Plow planting. Planting a crop at the time the land is plowed, or soon after, without additional tillage operations to prepare a seedbed.

Productivity, soil. The capability of a soil to produce a specified plant or sequence of plants under a given system of management.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material. See also Horizon, soil; Parent material.

Reaction. The degree of acidity or alkalinity of the soil, expressed in words or in pH values, as follows:

	pH
Extremely acid	Below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Sand. Individual fragments of rocks or minerals that have diameters ranging from 0.05 millimeter (0.002 inch) and 2.0 millimeters (0.079 inch). The term sand is also applied to a soil that contains 85 percent or more of sand and not more than 10 percent of clay.

Second bottom. The first terrace level above the flood plain, rarely or never flooded. See also First bottom; Flood plain.

Shrink-swell potential. The ability of a soil to lose volume with a loss in content of water and to gain volume with an increase in content of water.

Silt. Individual mineral particles of soil that range from 0.002 millimeter (0.000079 inch) to 0.05 millimeter (0.002 inch) in diameter. The term silt is also applied to a soil that contains 80 percent or more of silt and less than 12 percent of clay.

Sod waterways. Permanently vegetated, constructed or natural waterways that control the amount and degree of runoff and reduce erosion.

Soil. The natural medium for the growth of land plants on the surface of the earth; it is composed of organic and mineral materials.

Soil depth classes (as used in this report). *Very shallow*—less than 10 inches; *shallow*—10 to 20 inches; *moderately deep*—20 to 36 inches; and *deep*—more than 36 inches.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soils consists of the A and B horizons.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of structure are *platy*, *prismatic*, *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. Structureless soils are (1) *single grain*—each grain by itself, as in dune sand, or (2) *massive*—the particles adhere without any regular cleavage, as in many claypans and hardpans.

Subsoil. Technically, the B horizon; roughly, that part of the profile below plow depth in which roots normally grow.

Substratum. Any layer beneath the solum, or true soil. The term is applied to both parent material and to other layers unlike the parent material, below the B horizon or the subsoil.

Surface drainage. Collection and removal of excess water from the surface by shallow, graded drainage ditches.

Surface runoff. The amount of water removed by flow over the surface of the soil. The amount and rapidity of runoff are affected by the texture, structure, and porosity of the surface soil; the plant cover; the prevailing climate; and the slope. Terms used to express relative degrees of runoff are *very rapid*, *rapid*, *medium*, *slow*, *very slow*, and *ponded*.

Surface soil. That part of the soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness.

Terrace. (1) *Agricultural:* An embankment or ridge of earth constructed on the contour or at a slight angle to the contour. The terrace intercepts or retards runoff so that the water will infiltrate into the soil and so that any excess can flow slowly to a prepared outlet without causing erosion. (2) *Geologic:* An old alluvial plain, generally flat or undulating, that borders a river, lake, or the sea; frequently called second bottom as contrasted with flood plain; seldom subject to overflow.

Terrace interval. The distance, measured either vertically or horizontally, between terraces.

Texture, soil. The relative proportions of the various size groups of individual soil grains in a mass of soil. Specifically, it refers to the proportions of sand, silt, and clay in the soil. The basic classes, in order of increasing proportions of the fine separates, are *sand, loamy sand, fine sandy loam, loam, silt loam, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.*

Tilth, soil. The physical condition of a soil in respect to its fitness for the growth of a specified plant or sequence of plants.

Topography. The shape of the ground surface, such as hills, mountains, or plains. In the descriptions of the soils the more specific terms—*relief, physiography, landform,* or *slope*—are used.

Upland soils. Soils that developed in place from residual material, or from material that has not been moved by water in recent geologic times.

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GUIDE TO THE MAPPING UNITS, CAPABILITY UNITS, AND WOODLAND SUITABILITY GROUPS

[See table 1, p. 11, for the approximate acreage and proportionate extent of the soils; see table 2, p. 65, for estimated average acre yields and table 3, p. 68, for estimated yields of wood products. For information that is significant to engineering, see p. 92]

Map symbol	Mapping unit	Page	Capability unit		Woodland suitability group	
			Symbol	Page	Number	Page
AgB	Allegheny loam, 2 to 6 percent slopes	13	IIe-1	57	5	75
AgC	Allegheny loam, 6 to 12 percent slopes	14	IIIe-1	59	5	75
AgC2	Allegheny loam, 6 to 12 percent slopes, eroded	14	IIIe-1	59	5	75
AgD	Allegheny loam, 12 to 20 percent slopes	14	IVe-1	61	5	75
AgD2	Allegheny loam, 12 to 20 percent slopes, eroded	14	IVe-1	61	5	75
AsB	Ashton silt loam, 2 to 6 percent slopes	14	IIe-1	57	(1)	--------
AsC	Ashton silt loam, 6 to 12 percent slopes	15	IIIe-1	59	(1)	--------
AsD	Ashton silt loam, 12 to 20 percent slopes	15	IVe-1	61	(1)	--------
At	Atkins silt loam	15	IIIw-5	61	9	76
Ay	Atkins silty clay loam	15	IIIw-5	61	9	76
BaB	Beasley silt loam, 2 to 6 percent slopes	16	IIe-2	57	(1)	--------
BcB2	Beasley silty clay loam, 2 to 6 percent slopes, eroded	16	IIe-4	57	(1)	--------
BcC2	Beasley silty clay loam, 6 to 12 percent slopes, eroded	17	IIIe-4	59	(1)	--------
BcD2	Beasley silty clay loam, 12 to 20 percent slopes, eroded	17	IVe-3	61	(1)	--------
BcE2	Beasley silty clay loam, 20 to 30 percent slopes, eroded	17	VIe-1	62	(1)	--------
BeD3	Beasley silty clay, 12 to 20 percent slopes, severely eroded	17	VIe-2	62	(1)	--------
BfA	Bedford silt loam, 0 to 2 percent slopes	17	IIw-1	58	(1)	--------
BfB	Bedford silt loam, 2 to 6 percent slopes	18	IIe-6	57	(1)	--------
BoB	Blago silt loam, 0 to 4 percent slopes	18	IIIw-2	60	(1)	--------
CaA	Captina silt loam, 0 to 2 percent slopes	19	IIw-1	58	(1)	--------
CaB	Captina silt loam, 2 to 6 percent slopes	19	IIe-6	57	(1)	--------
CaC2	Captina silt loam, 6 to 12 percent slopes, eroded	19	IIIe-8	59	(1)	--------
CoD	Colyer shaly silt loam, 12 to 20 percent slopes	20	VIs-3	63	1	71
CoE	Colyer shaly silt loam, 20 to 30 percent slopes	20	VIIs-1	63	1	71
CoF	Colyer shaly silt loam, 30 to 50 percent slopes	20	VIIs-1	63	1	71
CoG	Colyer shaly silt loam, 50 to 60 percent slopes	20	VIIs-3	64	1	71
CsE2	Colyer shaly silty clay loam, 12 to 30 percent slopes, eroded	20	VIIs-3	64	1	71
CzB	Cruze silt loam, 2 to 8 percent slopes	21	IIe-10	58	(1)	--------

See footnotes at end of table.

GUIDE TO THE MAPPING UNITS, CAPABILITY UNITS, AND WOODLAND SUITABILITY GROUPS—Continued

Map symbol	Mapping unit	Page	Capability unit Symbol	Capability unit Page	Woodland suitability group Number	Woodland suitability group Page
Du	Dunning silty clay loam	21	IIIw-7	61	[1]	--------
EdD2	Eden soils, 12 to 20 percent slopes, eroded	22	IVe-2	61	10	77
EdE2	Eden soils, 20 to 30 percent slopes, eroded	22	VIe-1	62	10	77
EdF2	Eden soils, 30 to 50 percent slopes, eroded	22	VIIe-1	63	10	77
Eg	Egam silty clay loam	23	IIs-3	59	[1]	--------
EkB	Elk silt loam, 2 to 6 percent slopes	23	IIe-1	57	[1]	--------
EkC2	Elk silt loam, 6 to 12 percent slopes, eroded	23	IIIe-1	59	[1]	--------
EkD2	Elk silt loam, 12 to 20 percent slopes, eroded	24	IVe-1	61	[1]	--------
FaD3	Fairmount flaggy clay, 6 to 20 percent slopes, severely eroded	24	VIe-4	62	10	77
FaE3	Fairmount flaggy clay, 20 to 30 percent slopes, severely eroded	24	VIIe-2	63	10	77
FaF3	Fairmount flaggy clay, 30 to 60 percent slopes, severely eroded	25	VIIe-2	63	10	77
FfC	Fairmount flaggy silty clay loam, 6 to 12 percent slopes	24	IVe-6	61	10	77
FfD	Fairmount flaggy silty clay loam, 12 to 20 percent slopes	24	VIe-1	62	10	77
FmD2	Fairmount-rock land complex, 6 to 20 percent slopes, eroded	25	VIs-1	63	10	77
FmE2	Fairmount-rock land complex, 20 to 30 percent slopes, eroded	25	VIIs 2	63	10	77
FnD2	Fleming cherty silt loam, 12 to 20 percent slopes, eroded	25	IVe-3	61	[1]	--------
FoD	Fleming cherty silty clay loam, thin solum, 12 to 25 percent slopes	26	VIs-3	63	[1]	--------
FsC2	Fleming silt loam, 6 to 12 percent slopes, eroded	26	IIIe-2	59	[1]	--------
FsD2	Fleming silt loam, 12 to 20 percent slopes, eroded	26	IVe-3	61	[1]	--------
Gn	Gullied land	27	VIIe-4	63	[1]	--------
Gu	Guthrie silt loam	27	IVw-1	62	[1]	--------
HaC2	Hagerstown cherty silt loam, 6 to 12 percent slopes, eroded	27	IIIe-5	59	[1]	--------
HgA	Hagerstown silt loam, 0 to 2 percent slopes	28	I-3	57	[1]	--------
HgB	Hagerstown silt loam, 2 to 6 percent slopes	28	IIe-1	57	[1]	--------
HgC2	Hagerstown silt loam, 6 to 12 percent slopes, eroded	28	IIIe-1	59	[1]	--------
HgD2	Hagerstown silt loam, 12 to 20 percent slopes, eroded	28	IVe-1	61	[1]	--------
Hn	Huntington gravelly silt loam	29	IIs-1	59	[1]	--------
Hs	Huntington silt loam	29	I-1	57	[1]	--------
Hu	Huntington stony silt loam, shallow	29	Vs-1	62	[1]	--------
JeC	Jefferson gravelly silt loam, 2 to 12 percent slopes	29	IIIe-5	59	[1]	--------
JeD	Jefferson gravelly silt loam, 12 to 20 percent slopes	30	IVe-2	61	[1]	--------
JoA	Johnsburg and Cavode silt loams, 0 to 2 percent slopes	30	IIIw-1	60	9	76
JoB	Johnsburg and Cavode silt loams, 2 to 6 percent slopes	31	IIIw-3	60	7	76
JoC	Johnsburg and Cavode silt loams, 6 to 12 percent slopes	31	IVe-8	62	7	76
JoC2	Johnsburg and Cavode silt loams, 6 to 12 percent slopes, eroded	31	IVe-8	62	7	76
LaB	Landisburg cherty silt loam, 2 to 12 percent slopes	32	IIIe-15	60	[1]	--------
Lc	Lawrence silt loam	32	IIIw-1	60	[1]	--------
Ld	Lindside silt loam	33	I-2	57	[1]	--------
LoB	Lowell silt loam, 2 to 6 percent slopes	33	IIe-2	57	[1]	--------
LoB2	Lowell silt loam, 2 to 6 percent slopes, eroded	34	IIe-2	57	[1]	--------
LoC	Lowell silt loam, 6 to 12 percent slopes	34	IIIe-2	59	[1]	--------
LoC2	Lowell silt loam, 6 to 12 percent slopes, eroded	34	IIIe-2	59	[1]	--------
LoD2	Lowell silt loam, 12 to 20 percent slopes, eroded	34	IVe-3	61	[1]	--------
LpC3	Lowell silty clay loam, 6 to 12 percent slopes, severely eroded	34	IVe-11	62	[1]	--------
LpD3	Lowell silty clay loam, 12 to 20 percent slopes, severely eroded	34	VIe-2	62	[1]	--------
LrB2	Lowell silty clay loam, shallow, 2 to 6 percent slopes, eroded	34	IIIe-10	60	[1]	--------
LrC2	Lowell silty clay loam, shallow, 6 to 12 percent slopes, eroded	35	IVe-6	61	[1]	--------
LrD2	Lowell silty clay loam, shallow, 12 to 20 percent slopes, eroded	35	VIe-1	62	[1]	--------
LrE2	Lowell silty clay loam, shallow, 20 to 30 percent slopes, eroded	35	VIe-1	62	[1]	--------
LrF2	Lowell silty clay loam, shallow, 30 to 50 percent slopes, eroded	35	VIIe-1	63	[1]	--------
LsD3	Lowell silty clay, shallow, 12 to 20 percent slopes, severely eroded	35	VIe-4	62	[1]	--------
LsE3	Lowell silty clay shallow, 20 to 30 percent slopes, severely eroded	35	VIIe-1	63	[1]	--------
LvD2	Lowell very rocky silty clay loam, 6 to 20 percent slopes, eroded	36	VIs-1	63	[1]	--------
LwE3	Lowell very rocky silty clay, 20 to 30 percent slopes, severely eroded	36	VIIs-2	63	[1]	--------
Ma	Made land	36	[2]	------	[1]	--------
Me	Melvin silt loam	36	IIIw-5	61	[1]	--------
MfB	Monongahela fine sandy loam, 2 to 6 percent slopes	36	IIe-7	58	6	75
MfC	Monongahela fine sandy loam, 6 to 12 percent slopes	37	IIIe-9	60	6	75
MfC2	Monongahela fine sandy loam, 6 to 12 percent slopes, eroded	37	IIIe-9	60	6	75
MgA	Monongahela silt loam, 0 to 2 percent slopes	37	IIw-2	58	9	76
MgB	Monongahela silt loam, 2 to 6 percent slopes	38	IIe-7	58	6	75
MgC	Monongahela silt loam, 6 to 12 percent slopes	38	IIIe-9	60	6	75
MgC2	Monongahela silt loam, 6 to 12 percent slopes, eroded	38	IIIe-9	60	6	75
Mm	Mullins silt loam	38	IVw-1	62	9	76
MnC	Muse silt loam, 6 to 12 percent slopes	39	IIIe-2	59	8	76
MnD	Muse silt loam, 12 to 20 percent slopes	39	IVe-3	61	8	76
MsC2	Muse silty clay loam, 6 to 12 percent slopes, eroded	39	IIIe-2	59	8	76
MsD2	Muse silty clay loam, 12 to 20 percent slopes, eroded	39	IVe-3	61	8	76
MuD	Muskingum stony silt loam, 6 to 20 percent slopes	40	VIs-3	63	3 and 4.	74
MuE	Muskingum stony silt loam, 20 to 30 percent slopes	40	VIIs-1	63	1, 3, and 4.	71, 74, 74
MuF	Muskingum stony silt loam, 30 to 50 percent slopes	40	VIIs-1	63	1, 3, and 4.	71, 74, 74
MuG	Muskingum stony silt loam, 50 to 80 percent slopes	40	VIIs-3	64	1, 3, and 4.	71, 74, 74

See footnotes at end of table.

GUIDE TO THE MAPPING UNITS, CAPABILITY UNITS, AND WOODLAND SUITABILITY GROUPS—Continued

Map symbol	Mapping unit	Page	Capability unit Symbol	Capability unit Page	Woodland suitability group Number	Woodland suitability group Page
Ne	Newark silt loam	40	IIw-4	58	([1])	--------
NkB	Nicholson silt loam, 0 to 6 percent slopes	41	IIe 10	58	([1])	--------
OtC	Otway silty clay, 6 to 12 percent slopes	42	IVe-6	61	10	77
OtC2	Otway silty clay, 6 to 12 percent slopes, eroded	42	VIe-1	62	10	77
OtD2	Otway silty clay, 12 to 20 percent slopes, eroded	42	VIIs-3	64	10	77
OtE2	Otway silty clay, 20 to 30 percent slopes, eroded	42	VIIs-3	64	10	77
OtF2	Otway silty clay, 30 to 50 percent slopes, eroded	42	VIIs-3	64	10	77
Ph	Philo silt loam	43	I-2	57	([1])	--------
Pm	Pope fine sandy loam	43	I-1	57	([1])	--------
Pn	Pope gravelly silt loam	44	IIs 1	59	([1])	--------
Po	Pope silt loam	43	I-1	57	([1])	--------
Pr	Purdy silt loam	44	IVw-1	62	9	76
RaB	Rarden silt loam, 2 to 6 percent slopes	44	IIIe-14	60	8	76
RaC	Rarden silt loam, 6 to 12 percent slopes	45	IVe-8	62	8	76
RaD	Rarden silt loam, 12 to 20 percent slopes	45	VIe-8	63	8	76
RcC2	Rarden silty clay loam, 6 to 12 percent slopes, eroded	45	IVe-8	62	8	76
RcD2	Rarden silty clay loam, 12 to 20 percent slopes, eroded	45	VIe-8	63	8	76
Re	Robertsville silt loam	45	IVw-1	62	([1])	--------
RkD	Rockcastle silt loam, 12 to 20 percent slopes	46	VIe-8	63	3	74
RkE	Rockcastle silt loam, 20 to 30 percent slopes	46	VIIe-2	63	3	74
RkF	Rockcastle silt loam, 30 to 50 percent slopes	47	VIIe-2	63	3	74
RsD2	Rockcastle silty clay, 12 to 20 percent slopes, eroded	47	VIIs-3	64	2	74
RsE2	Rockcastle silty clay, 20 to 30 percent slopes, eroded	47	VIIs-3	64	2	74
Rt	Rock land	47	VIIs 5	64	10	77
SaB	Sees silty clay loam, 2 to 6 percent slopes	47	IIw-3	58	([1])	--------
SaC	Sees silty clay loam, 6 to 12 percent slopes	47	IIIe-8	59	([1])	--------
ScA	Sequatchie silty clay loam, heavy variant, 0 to 4 percent slopes	48	IIs-3	59	([1])	--------
SeB	Shelbyville silt loam, 2 to 6 percent slopes	48	IIe-1	57	([1])	--------
SeC	Shelbyville silt loam, 6 to 12 percent slopes	49	IIIe-1	59	([1])	--------
SeC2	Shelbyville silt loam, 6 to 12 percent slopes, eroded	49	IIIe-1	59	([1])	--------
ShD2	Shrouts clay, 6 to 20 percent slopes, eroded	50	VIIs-3	64	10	77
ShE2	Shrouts clay, 20 to 30 percent slopes, eroded	50	VIIs-3	64	10	77
SsD	Shrouts silty clay loam, 6 to 20 percent slopes	49	VIe-8	63	10	77
St	Stendal silt loam	50	IIw-4	58	([1])	--------
Ta	Taft silt loam	50	IIIw-1	60	([1])	--------
Tc	Terrace escarpments	51	VIe-1	62	([1])	--------
TsB	Tilsit silt loam, 2 to 6 percent slopes	51	IIe-7	58	([1])	--------
TsC	Tilsit silt loam, 6 to 12 percent slopes	51	IIIe-9	60	([1])	--------
TtB	Trappist silt loam, 2 to 6 percent slopes	52	IIe-9	58	8	76
TtC2	Trappist silt loam, 6 to 12 percent slopes, eroded	52	IIIe-7	59	8	76
TtD2	Trappist silt loam, 12 to 20 percent slopes, eroded	52	IVe-4	61	8	76
Tv	Tyler fine sandy loam	53	IIIw-1	60	9	76
Ty	Tyler silt loam	53	IIIw 1	60	9	76
Wh	Whitwell silt loam	54	IIw-4	58	([1])	--------
WoB	Woolper silty clay loam, 2 to 6 percent slopes	54	IIe-4	57	([1])	--------
WoC	Woolper silty clay loam, 6 to 12 percent slopes	54	IIIe-4	59	([1])	--------
WoD2	Woolper silty clay loam, 12 to 20 percent slopes, eroded	55	IVe-3	61	([1])	--------

[1] Not placed in a woodland suitability group.
[2] Not placed in a capability unit.

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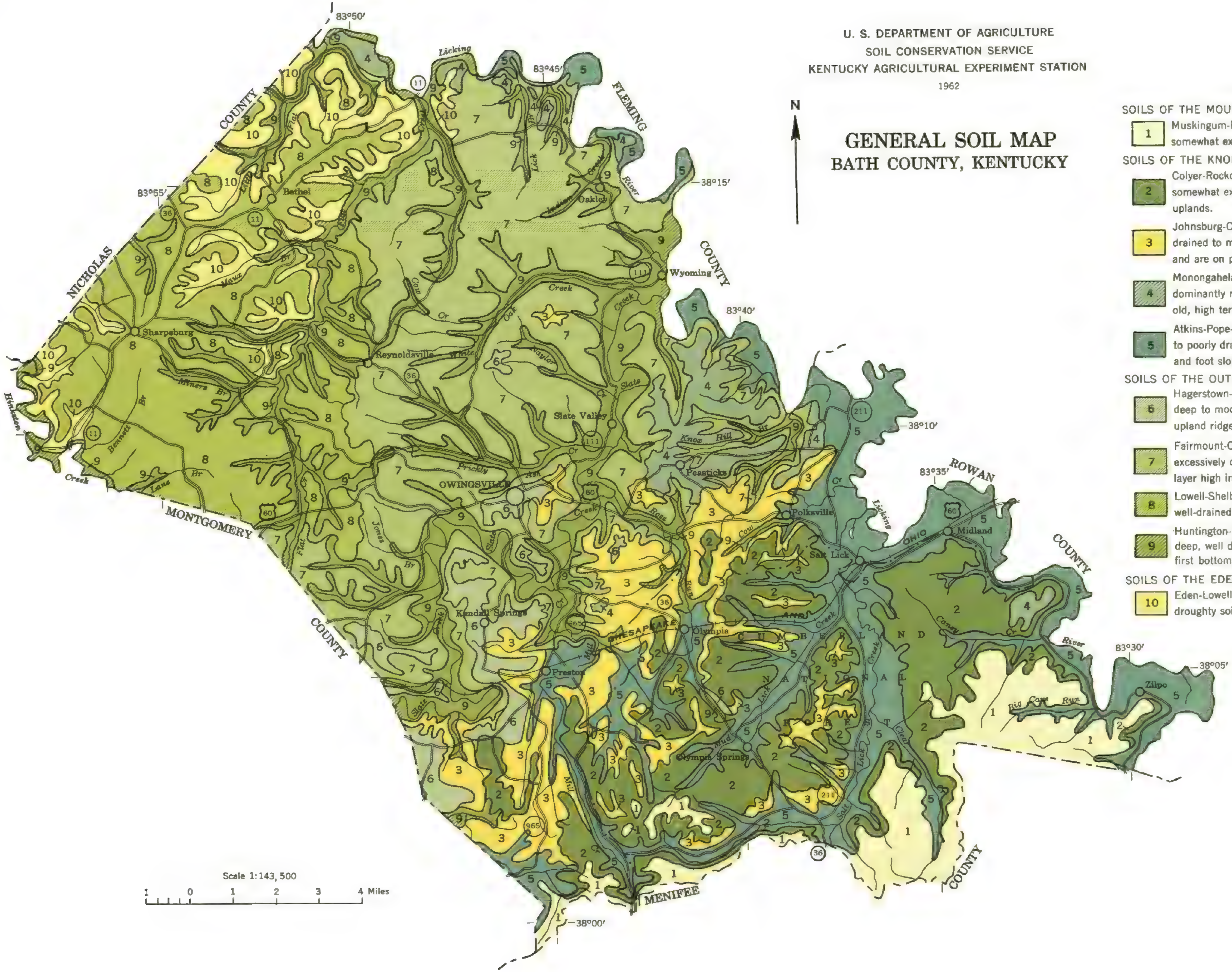
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
KENTUCKY AGRICULTURAL EXPERIMENT STATION
1962

GENERAL SOIL MAP
BATH COUNTY, KENTUCKY



SOIL ASSOCIATIONS

SOILS OF THE MOUNTAIN REGION

1 Muskingum-Rockcastle association: Steep to very steep, somewhat excessively drained, shallow soils of escarpments.

SOILS OF THE KNOBS REGION

2 Colyer-Rockcastle association: Moderately steep to steep, somewhat excessively drained, shallow soils of dissected uplands.

3 Johnsburg-Cavode-Rarden association: Nearly level, poorly drained to moderately well drained soils that have a fragipan and are on plains in the uplands.

4 Monongahela-Allegheny-Tyler association: Level to sloping, dominantly moderately well drained to well drained soils of old, high terraces.

5 Atkins-Pope-Stendal association: Nearly level, well-drained to poorly drained soils on first bottoms, stream terraces, and foot slopes.

SOILS OF THE OUTER BLUEGRASS REGION

6 Hagerstown-Fleming-Bedford association: Level to sloping, deep to moderately deep, dominantly well drained soils of upland ridges.

7 Fairmount-Otway association: Steep, shallow, well-drained to excessively drained soils that have a dark-colored surface layer high in calcium and are on highly dissected uplands.

8 Lowell-Shelbyville association: Undulating to rolling, deep, well-drained soils of uplands.

9 Huntington-Egam-Captina association: Chiefly nearly level, deep, well drained to moderately well drained soils of narrow first bottoms, stream terraces, and foot slopes.

SOILS OF THE EDEN HILLS

10 Eden-Lowell association: Steep, moderately deep, somewhat droughty soils of highly dissected uplands.

U. S. DEPARTMENT OF AGRICULTURE
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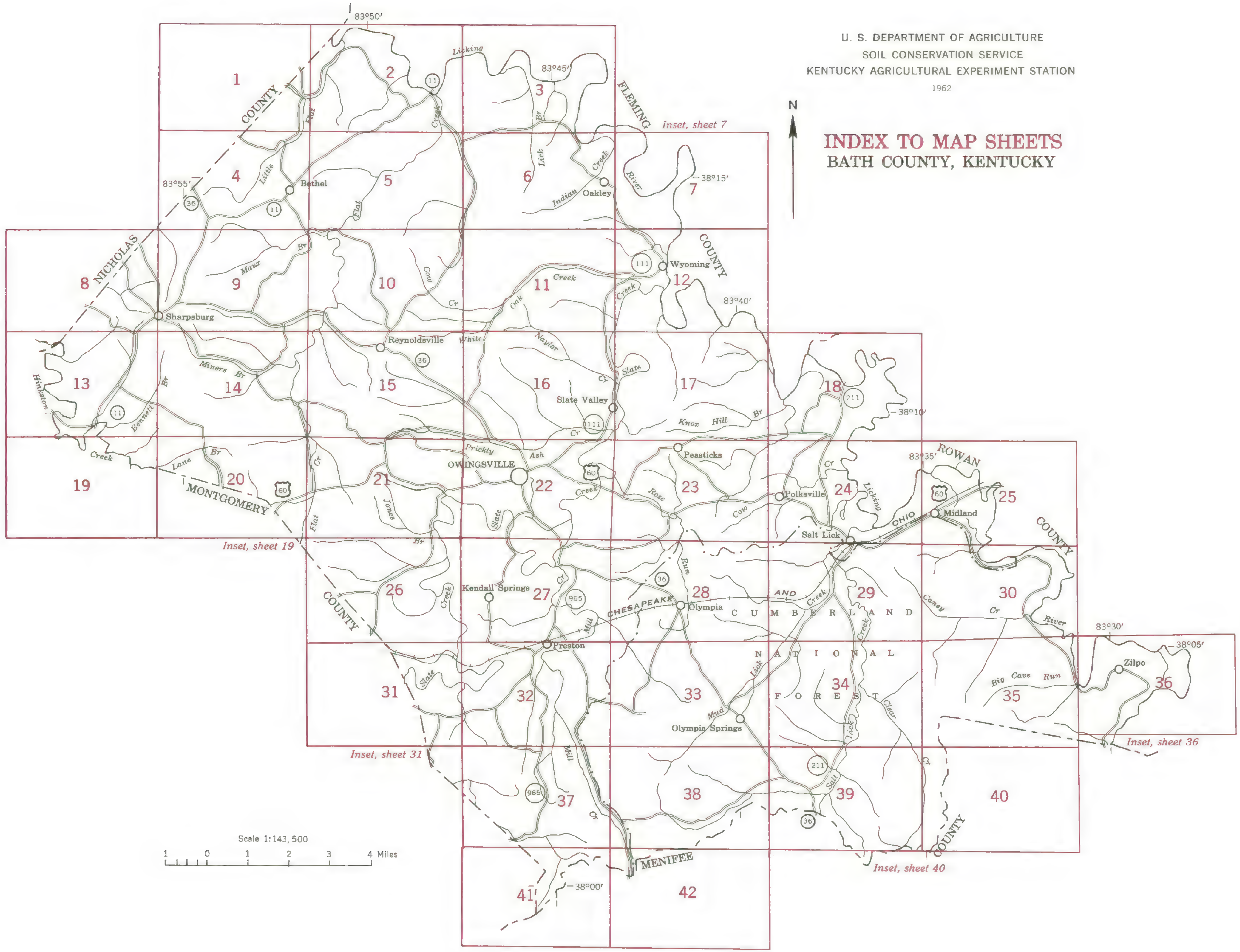
1962

INDEX TO MAP SHEETS
BATH COUNTY, KENTUCKY



SOIL LEGEND

The first capital letter is the initial one of the soil name. A second capital letter shows the slope. Symbols without a slope letter are those of nearly level soils, such as Huntington silt loam, or of land types that have a considerable range of slope, such as Gullied land. A final number, 2 or 3, shows that the soil is eroded, or severely eroded.

SYMBOL	NAME
AgB	Allegheny loam, 2 to 6 percent slopes
AgC	Allegheny loam, 6 to 12 percent slopes
AgC2	Allegheny loam, 6 to 12 percent slopes, eroded
AgD	Allegheny loam, 12 to 20 percent slopes
AgD2	Allegheny loam, 12 to 20 percent slopes, eroded
AsB	Ashton silt loam, 2 to 6 percent slopes
AsC	Ashton silt loam, 6 to 12 percent slopes
AsD	Ashton silt loam, 12 to 20 percent slopes
At	Atkins silt loam
Ay	Atkins silty clay loam
BaB	Beasley silt loam, 2 to 6 percent slopes
BcB2	Beasley silty clay loam, 2 to 6 percent slopes, eroded
BcC2	Beasley silty clay loam, 6 to 12 percent slopes, eroded
BcD2	Beasley silty clay loam, 12 to 20 percent slopes, eroded
BcE2	Beasley silty clay loam, 20 to 30 percent slopes, eroded
BeD3	Beasley silty clay, 12 to 20 percent slopes, severely eroded
BfA	Bedford silt loam, 0 to 2 percent slopes
BfB	Bedford silt loam, 2 to 6 percent slopes
BoB	Blago silt loam, 0 to 4 percent slopes
CaA	Captina silt loam, 0 to 2 percent slopes
CaB	Captina silt loam, 2 to 6 percent slopes
CaC2	Captina silt loam, 6 to 12 percent slopes, eroded
CoD	Colyer shaly silt loam, 12 to 20 percent slopes
CoE	Colyer shaly silt loam, 20 to 30 percent slopes
CoF	Colyer shaly silt loam, 30 to 50 percent slopes
CoG	Colyer shaly silt loam, 50 to 60 percent slopes
CsE2	Colyer shaly silty clay loam, 12 to 30 percent slopes, eroded
CzB	Cruze silt loam, 2 to 8 percent slopes
Du	Dunning silty clay loam
EdD2	Eden soils, 12 to 20 percent slopes, eroded
EdE2	Eden soils, 20 to 30 percent slopes, eroded
EdF2	Eden soils, 30 to 50 percent slopes, eroded
Eg	Egam silty clay loam
EkB	Elk silt loam, 2 to 6 percent slopes
EkC2	Elk silt loam, 6 to 12 percent slopes, eroded
EkD2	Elk silt loam, 12 to 20 percent slopes, eroded
FaD3	Fairmount flaggy clay, 6 to 20 percent slopes, severely eroded
FaE3	Fairmount flaggy clay, 20 to 30 percent slopes, severely eroded
FaF3	Fairmount flaggy clay, 30 to 60 percent slopes, severely eroded
FfC	Fairmount flaggy silty clay loam, 6 to 12 percent slopes
FfD	Fairmount flaggy silty clay loam, 12 to 20 percent slopes
FmD2	Fairmount-rock land complex, 6 to 20 percent slopes, eroded
FmE2	Fairmount-rock land complex, 20 to 30 percent slopes, eroded
FnD2	Fleming cherty silt loam, 12 to 20 percent slopes, eroded
FoD	Fleming cherty silty clay loam, thin solum, 12 to 25 percent slopes
FsC2	Fleming silt loam, 6 to 12 percent slopes, eroded
FsD2	Fleming silt loam, 12 to 20 percent slopes, eroded
Gn	Gullied land
Gu	Guthrie silt loam
HaC2	Hagerstown cherty silt loam, 6 to 12 percent slopes, eroded
HgA	Hagerstown silt loam, 0 to 2 percent slopes
HgB	Hagerstown silt loam, 2 to 6 percent slopes
HgC2	Hagerstown silt loam, 6 to 12 percent slopes, eroded
HgD2	Hagerstown silt loam, 12 to 20 percent slopes, eroded
Hn	Huntington gravelly silt loam
Hs	Huntington silt loam
Hu	Huntington stony silt loam, shallow
JeC	Jefferson gravelly silt loam, 2 to 12 percent slopes
JeD	Jefferson gravelly silt loam, 12 to 20 percent slopes
JoA	Johnsburg and Cavode silt loams, 0 to 2 percent slopes
JoB	Johnsburg and Cavode silt loams, 2 to 6 percent slopes
JoC	Johnsburg and Cavode silt loams, 6 to 12 percent slopes
JoC2	Johnsburg and Cavode silt loams, 6 to 12 percent slopes, eroded
LaB	Landisburg cherty silt loam, 2 to 12 percent slopes
Lc	Lawrence silt loam
Ld	Lindside silt loam
LoB	Lowell silt loam, 2 to 6 percent slopes
LoB2	Lowell silt loam, 2 to 6 percent slopes, eroded
LoC	Lowell silt loam, 6 to 12 percent slopes
LoC2	Lowell silt loam, 6 to 12 percent slopes, eroded
LoD2	Lowell silt loam, 12 to 20 percent slopes, eroded
LpC3	Lowell silty clay loam, 6 to 12 percent slopes, severely eroded
LpD3	Lowell silty clay loam, 12 to 20 percent slopes, severely eroded
LrB2	Lowell silty clay loam, shallow, 2 to 6 percent slopes, eroded
LrC2	Lowell silty clay loam, shallow, 6 to 12 percent slopes, eroded
LrD2	Lowell silty clay loam, shallow, 12 to 20 percent slopes, eroded
LrE2	Lowell silty clay loam, shallow, 20 to 30 percent slopes, eroded
LrF2	Lowell silty clay loam, shallow, 30 to 50 percent slopes, eroded
LsD3	Lowell silty clay, shallow, 12 to 20 percent slopes, severely eroded
LsE3	Lowell silty clay, shallow, 20 to 30 percent slopes, severely eroded
LvD2	Lowell very rocky silty clay loam, 6 to 20 percent slopes, eroded
LwE3	Lowell very rocky silty clay, 20 to 30 percent slopes, severely eroded
Ma	Made land
Me	Melvin silt loam
MfB	Monongahela fine sandy loam, 2 to 6 percent slopes
MfC	Monongahela fine sandy loam, 6 to 12 percent slopes
MfC2	Monongahela fine sandy loam, 6 to 12 percent slopes, eroded
MgA	Monongahela silt loam, 0 to 2 percent slopes
MgB	Monongahela silt loam, 2 to 6 percent slopes
MgC	Monongahela silt loam, 6 to 12 percent slopes
MgC2	Monongahela silt loam, 6 to 12 percent slopes, eroded
Mm	Mullins silt loam
MnC	Muse silt loam, 6 to 12 percent slopes
MnD	Muse silt loam, 12 to 20 percent slopes
MsC2	Muse silty clay loam, 6 to 12 percent slopes, eroded
MsD2	Muse silty clay loam, 12 to 20 percent slopes, eroded
MuD	Muskingum stony silt loam, 6 to 20 percent slopes
MuE	Muskingum stony silt loam, 20 to 30 percent slopes
MuF	Muskingum stony silt loam, 30 to 50 percent slopes
MuG	Muskingum stony silt loam, 50 to 80 percent slopes
Ne	Newark silt loam
NkB	Nicholson silt loam, 0 to 6 percent slopes
OtC	Otway silty clay, 6 to 12 percent slopes
OtC2	Otway silty clay, 6 to 12 percent slopes, eroded
OtD2	Otway silty clay, 12 to 20 percent slopes, eroded
OtE2	Otway silty clay, 20 to 30 percent slopes, eroded
OtF2	Otway silty clay, 30 to 50 percent slopes, eroded
Ph	Philo silt loam
Pm	Pope fine sandy loam
Pn	Pope gravelly silt loam
Po	Pope silt loam
Pr	Purdy silt loam
RaB	Rarden silt loam, 2 to 6 percent slopes
RaC	Rarden silt loam, 6 to 12 percent slopes
RaD	Rarden silt loam, 12 to 20 percent slopes
RcC2	Rarden silty clay loam, 6 to 12 percent slopes, eroded
RcD2	Rarden silty clay loam, 12 to 20 percent slopes, eroded
Re	Robertsville silt loam
RkD	Rockcastle silt loam, 12 to 20 percent slopes
RkE	Rockcastle silt loam, 20 to 30 percent slopes
RkF	Rockcastle silt loam, 30 to 50 percent slopes
RsD2	Rockcastle silty clay, 12 to 20 percent slopes, eroded
RsE2	Rockcastle silty clay, 20 to 30 percent slopes, eroded
Rt	Rock land
SaB	Sees silty clay loam, 2 to 6 percent slopes
SaC	Sees silty clay loam, 6 to 12 percent slopes
ScA	Sequatchie silty clay loam, heavy variant, 0 to 4 percent slopes
SeB	Shelbyville silt loam, 2 to 6 percent slopes
SeC	Shelbyville silt loam, 6 to 12 percent slopes
SeC2	Shelbyville silt loam, 6 to 12 percent slopes, eroded
ShD2	Shrouts clay, 6 to 20 percent slopes, eroded
ShE2	Shrouts clay, 20 to 30 percent slopes, eroded
SsD	Shrouts silty clay loam, 6 to 20 percent slopes
St	Stendal silt loam
Ta	Taft silt loam
Tc	Terrace escarpments
TsB	Tilsit silt loam, 2 to 6 percent slopes
TsC	Tilsit silt loam, 6 to 12 percent slopes
TtB	Trappist silt loam, 2 to 6 percent slopes
TtC2	Trappist silt loam, 6 to 12 percent slopes, eroded
TtD2	Trappist silt loam, 12 to 20 percent slopes, eroded
Tv	Tyler fine sandy loam
Ty	Tyler silt loam
Wh	Whitwell silt loam
WoB	Woolper silty clay loam, 2 to 6 percent slopes
WoC	Woolper silty clay loam, 6 to 12 percent slopes
WoD2	Woolper silty clay loam, 12 to 20 percent slopes, eroded

Soil map constructed 1962 by Cartographic Division, Soil Conservation Service, USDA, from 1954 aerial photographs. Controlled mosaic based on Kentucky plane coordinate system, north zone, Lambert conformal conic projection, 1927 North American datum.

CONVENTIONAL SIGNS

WORKS AND STRUCTURES

Highways and roads
- Dual
- Good motor
- Poor motor
- Trail

Highway markers
- National Interstate
- U. S.
- State

Railroads
- Single track
- Multiple track
- Abandoned

Bridges and crossings
- Road
- Trail, foot
- Railroad
- Ferries
- Ford
- Grade
- R. R. over
- R. R. under
- Tunnel

Buildings
- School
- Church
- Station

Mines and Quarries

Mine dump

Pits, gravel or other

Power lines

Pipe lines

Cemeteries

Dams

Levees

Tanks

Oil wells

Sawmill

Forest fire or lookout station

BOUNDARIES

National or state

County

Township, U. S.

Section line, corner

Reservation

Land grant

DRAINAGE

Streams
- Perennial
- Intermittent, unclass.
  - Crossable with tillage implements
  - Not crossable with tillage implements

Canals and ditches — CANAL, DITCH

Lakes and ponds
- Perennial
- Intermittent

Wells — flowing

Springs

Marsh

Wet spot

RELIEF

Escarpments
- Bedrock
- Other

Prominent peaks

Depressions — Large, Small
- Crossable with tillage implements
- Not crossable with tillage implements
- Contains water most of the time

SOIL SURVEY DATA

Soil boundary and symbol — Dx

Gravel

Stones

Rock outcrops

Chert fragments

Clay spot

Sand spot

Gumbo or scabby spot

Made land

Severely eroded spot

Blowout, wind erosion

Gullies

1

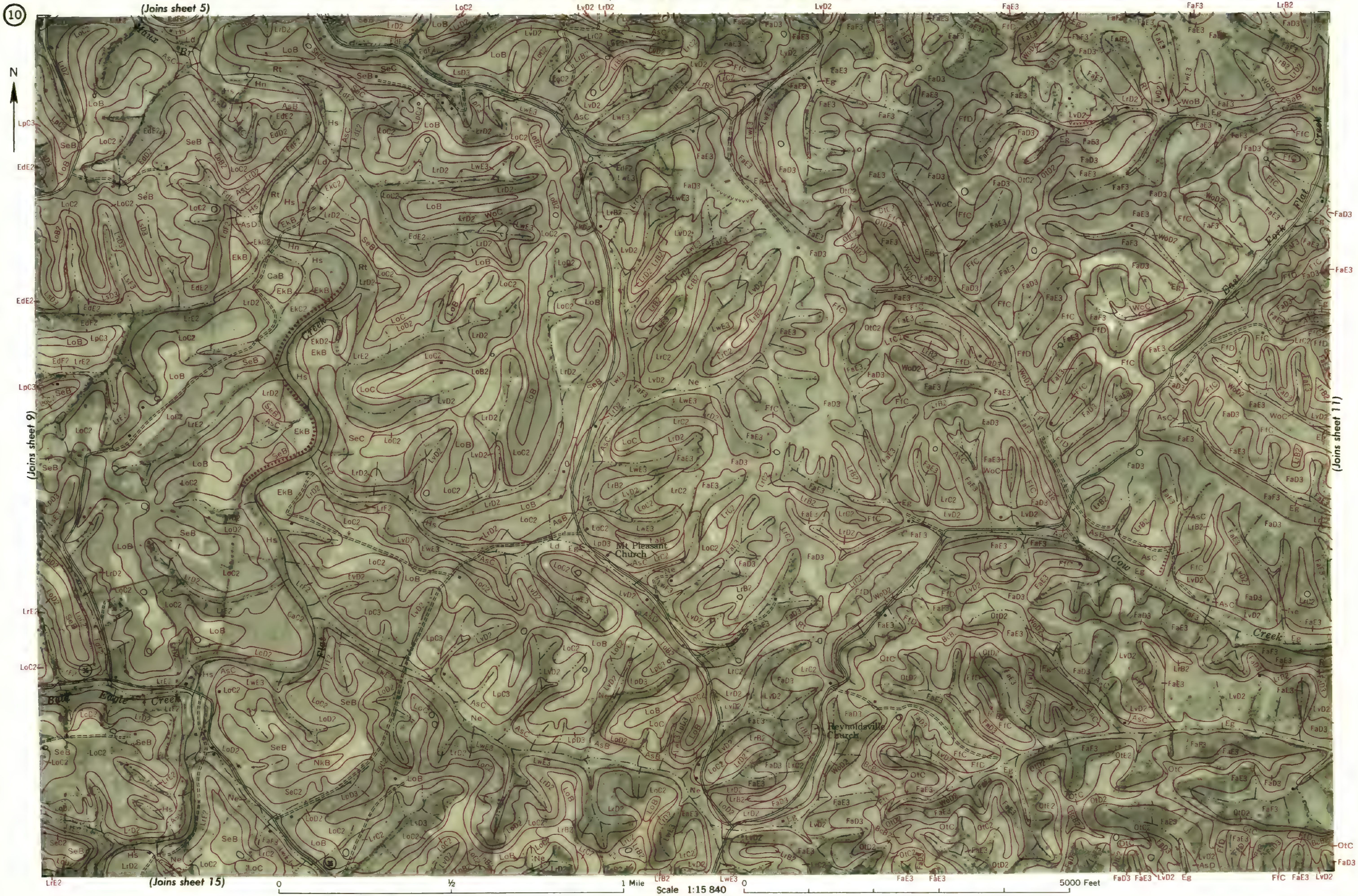
N

(Joins sheet 2)

(Joins sheet 4)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

This map is one of a set compiled in 1962 as a part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Kentucky Agricultural Experiment Station



0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

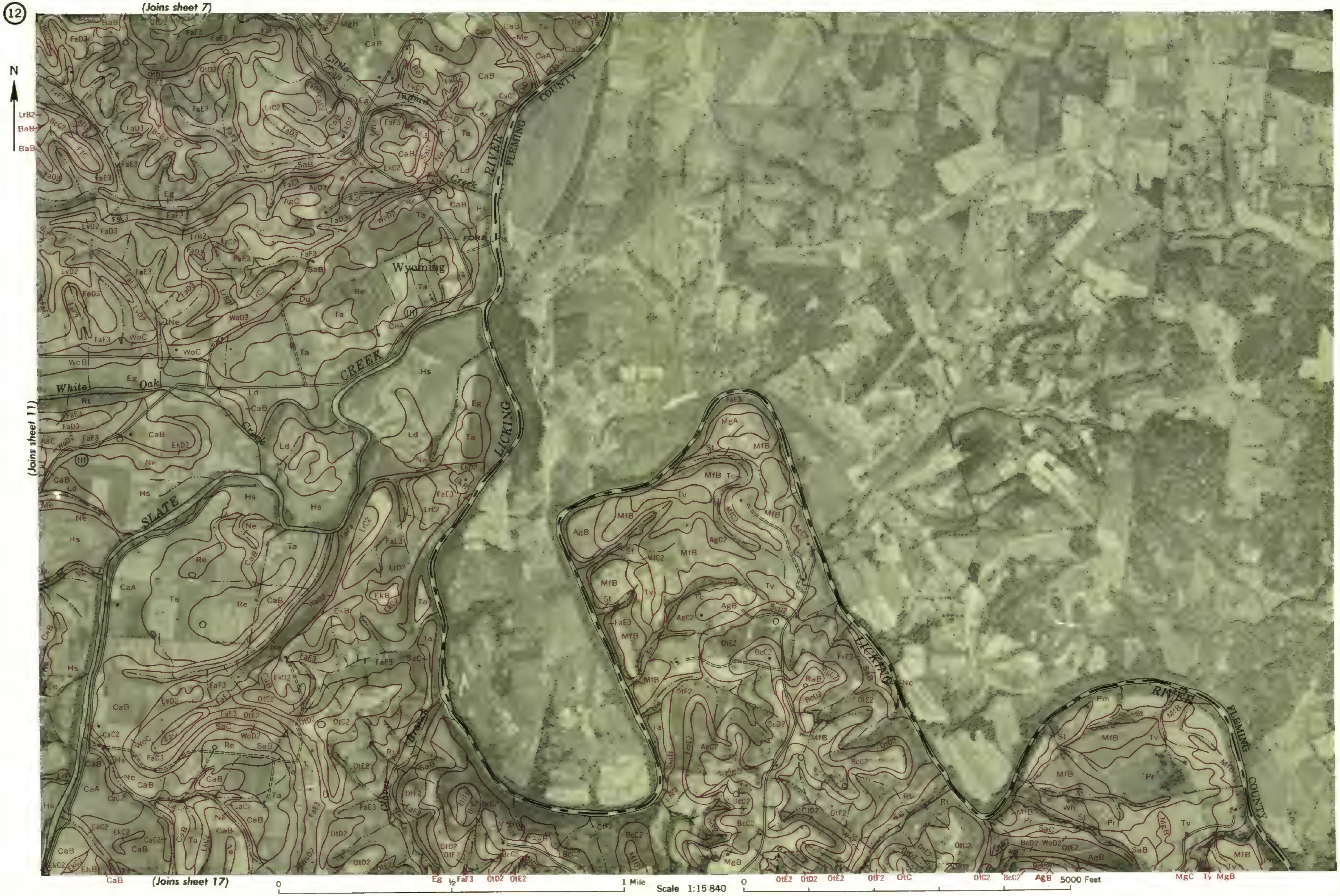
BATH COUNTY, KENTUCKY — SHEET NUMBER 11

Scale 1:15 840

0 ½ 1 Mile

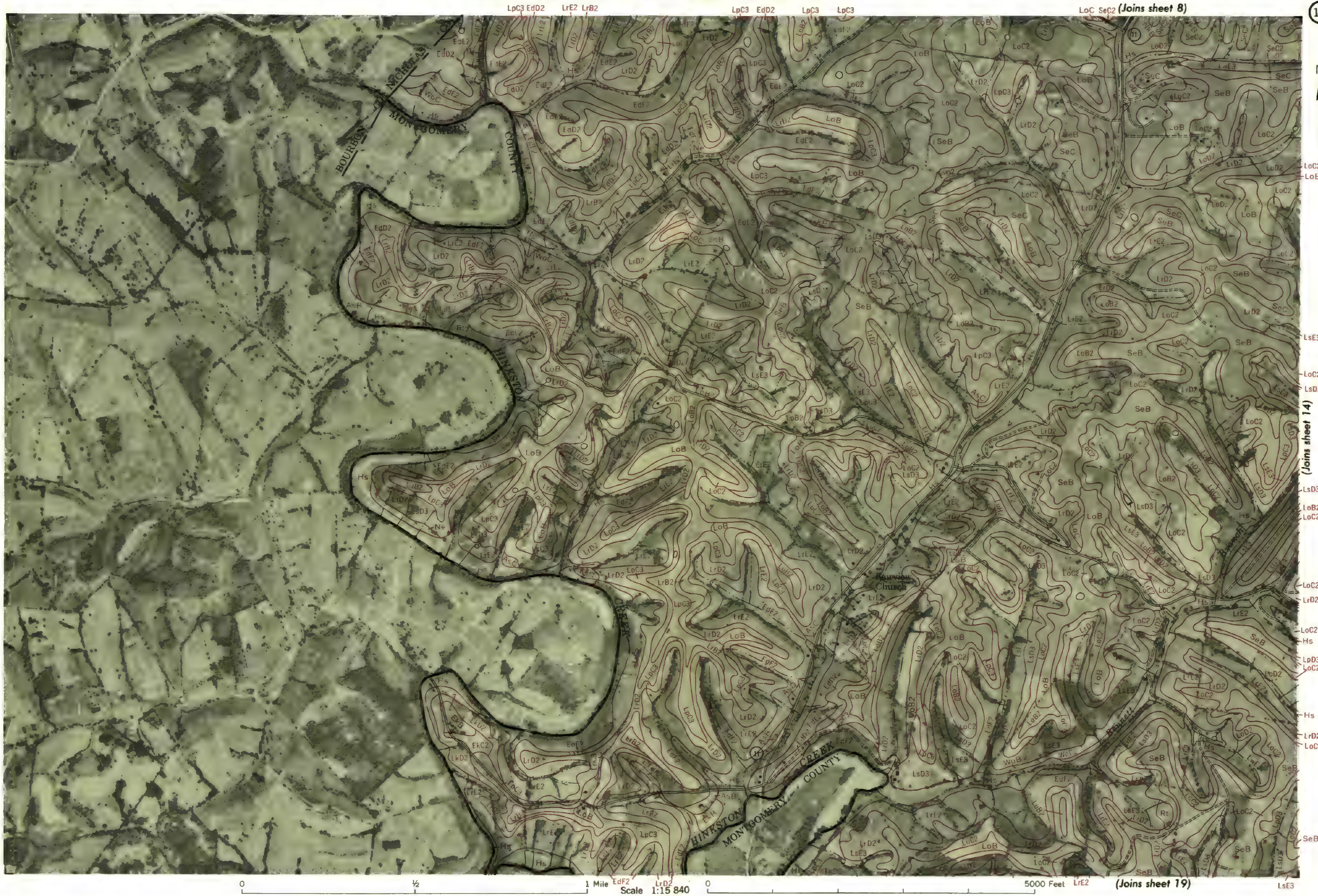
0 5000 Feet

This map is one of a set compiled in 1962 as a part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Kentucky Agricultural Experiment Station.


12
(Joins sheet 7)
(Joins sheet 11)
(Joins sheet 17)
N
Wyoming
Little Indian Creek
White Oak Creek
SLATE CREEK
LICKING RIVER
FLEMING COUNTY
FORD
Scale 1:15 840
0 ½ 1 Mile
0 5000 Feet

BATH COUNTY, KENTUCKY — SHEET NUMBER 13

13



0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

This map is one of a set compiled in 1962 as a part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Kentucky Agricultural Experiment Station.


14
(Joins sheet 9)
N
(Joins sheet 13)
(Joins sheet 15)
(Joins sheet 20)
Minors
Branch
Flat
Creek
0
½
1 Mile
Scale 1:15 840
0
5000 Feet

15

(Joins sheet 10)

(Joins sheet 14)

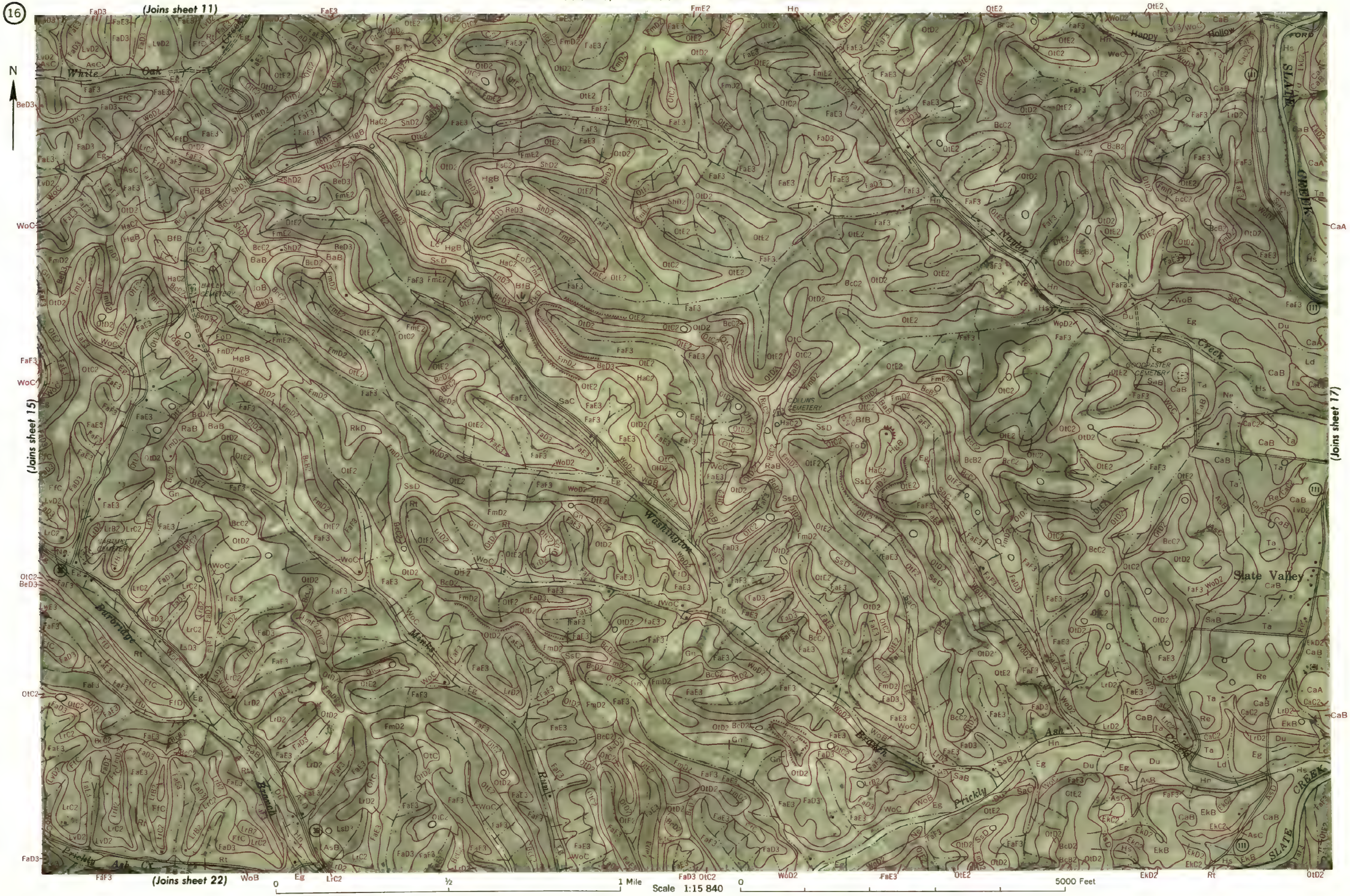
(Joins sheet 16)

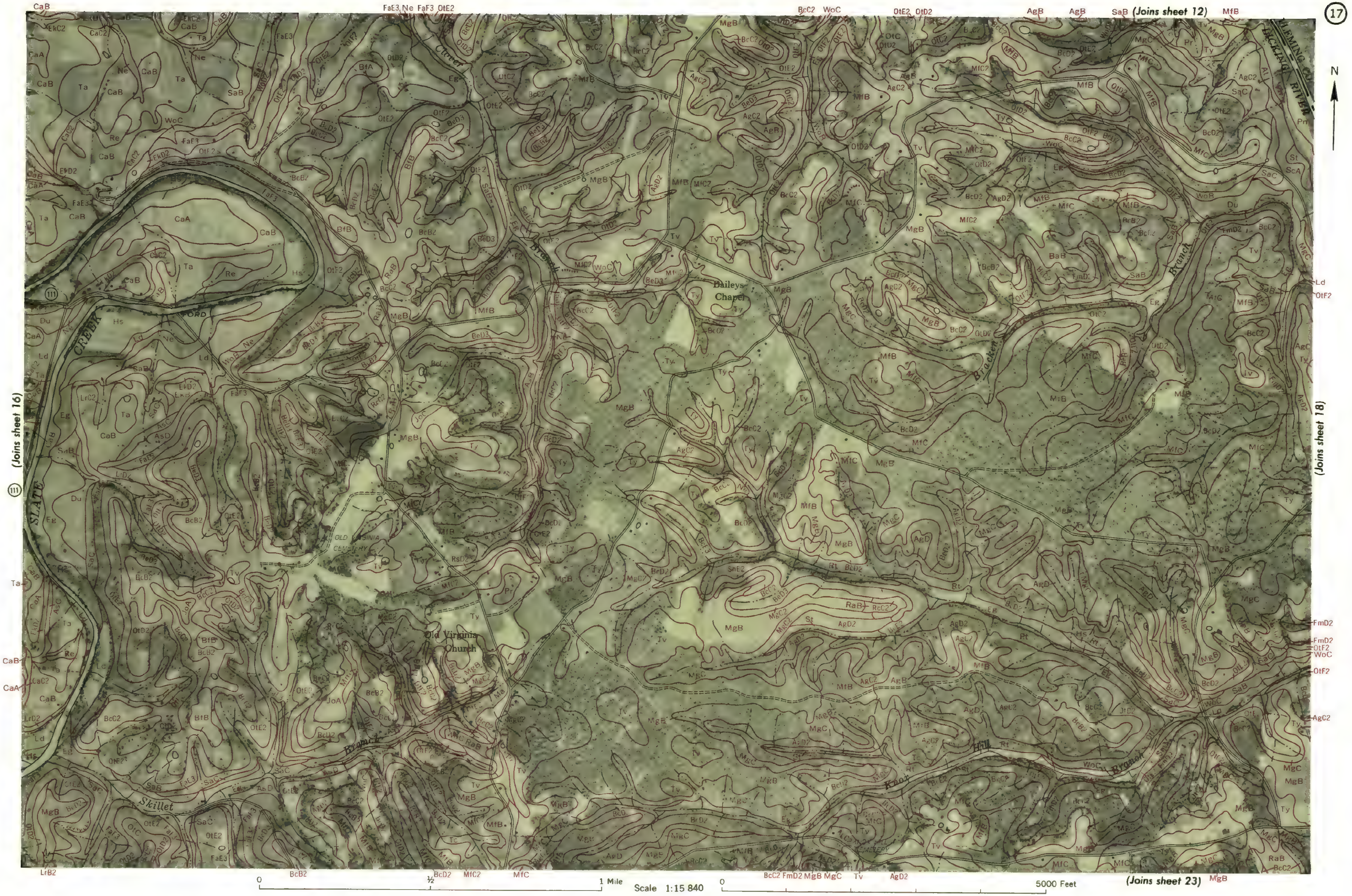
(Joins sheet 21)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

This map is one of a set compiled in 1962 as a part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Kentucky Agricultural Experiment Station.

BATH COUNTY, KENTUCKY — SHEET NUMBER 16





This map is one of a set compiled in 1962 as a part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Kentucky Agricultural Experiment Station.

18

N

MgC

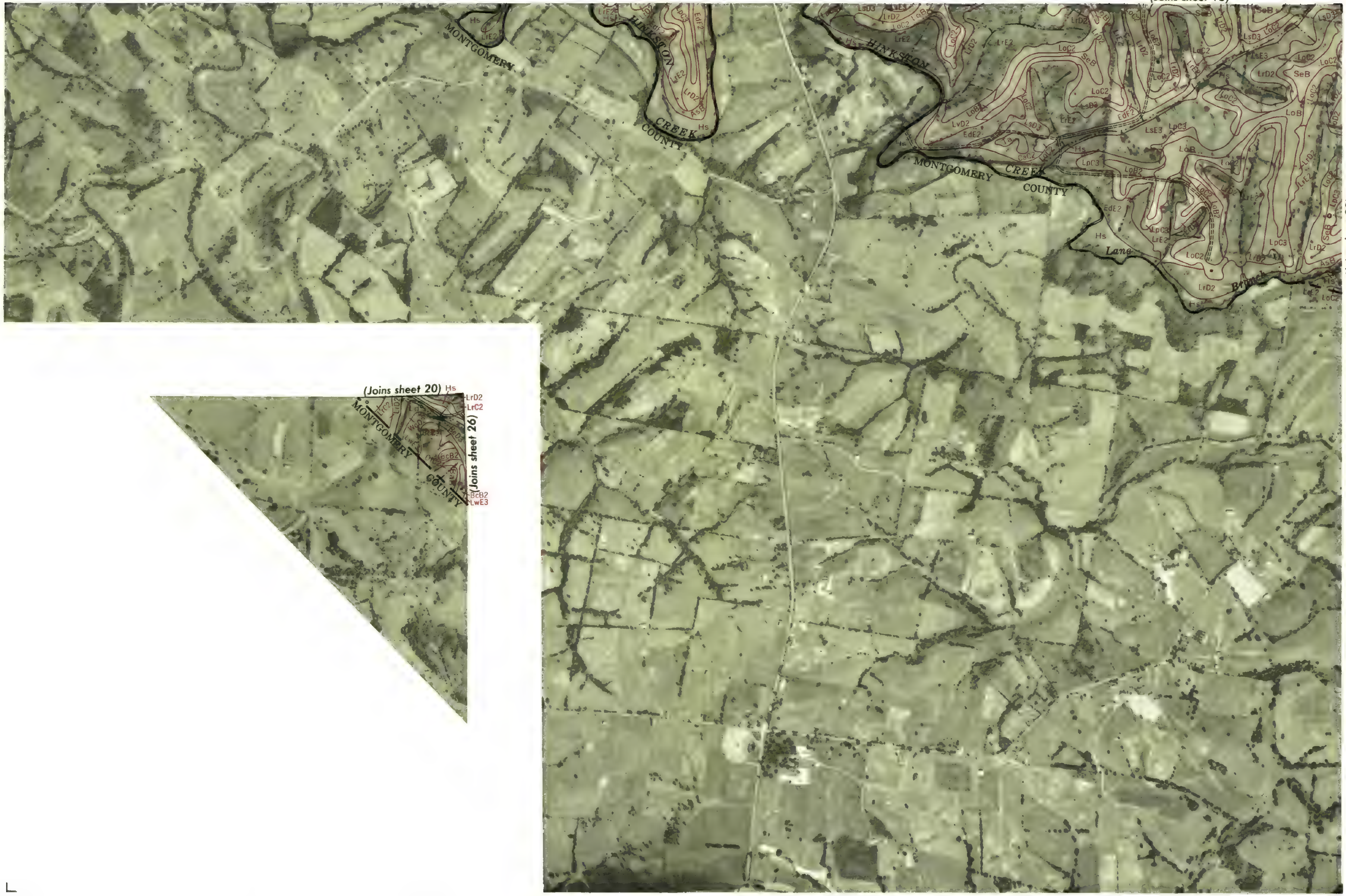
(Joins sheet 17)

BcC2

BcC2

FmD2 (Joins sheet 24) Pr MgC MfB

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet



0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

This map is one of a set compiled in 1962 as a part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Kentucky Agricultural Experiment Station

2

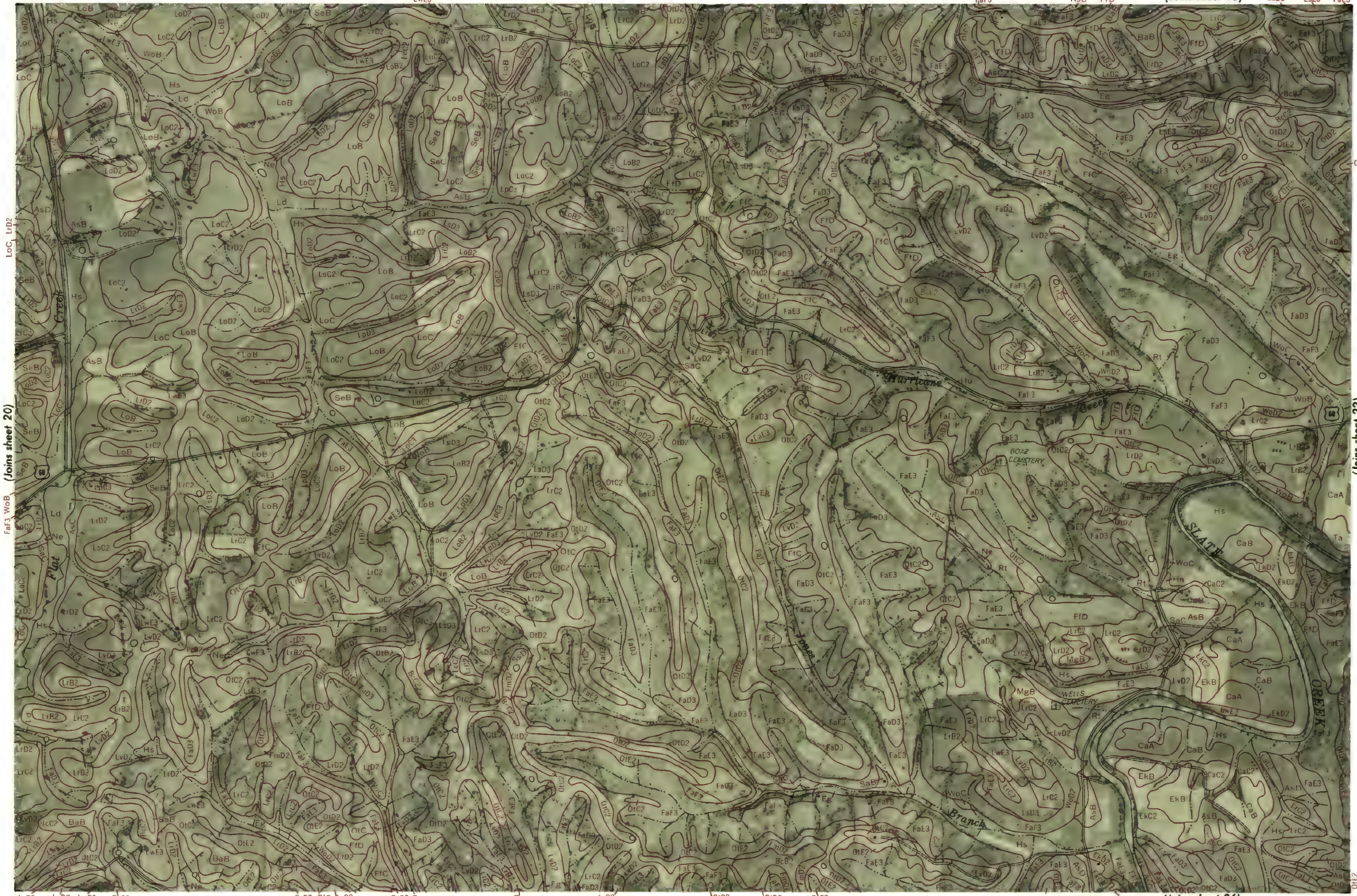

N
FLEMING COUNTY
NICHOLAS COUNTY
LICKING RIVER
FLAT CREEK
(Joins sheet 1)
(Joins sheet 3)
(Joins sheet 5)
0
½
1 Mile
Scale 1:15 840
0
5000 Feet

BATH COUNTY, KENTUCKY — SHEET NUMBER 20

BATH COUNTY, KENTUCKY — SHEET NUMBER 21

(21)

(Joins sheet 15)



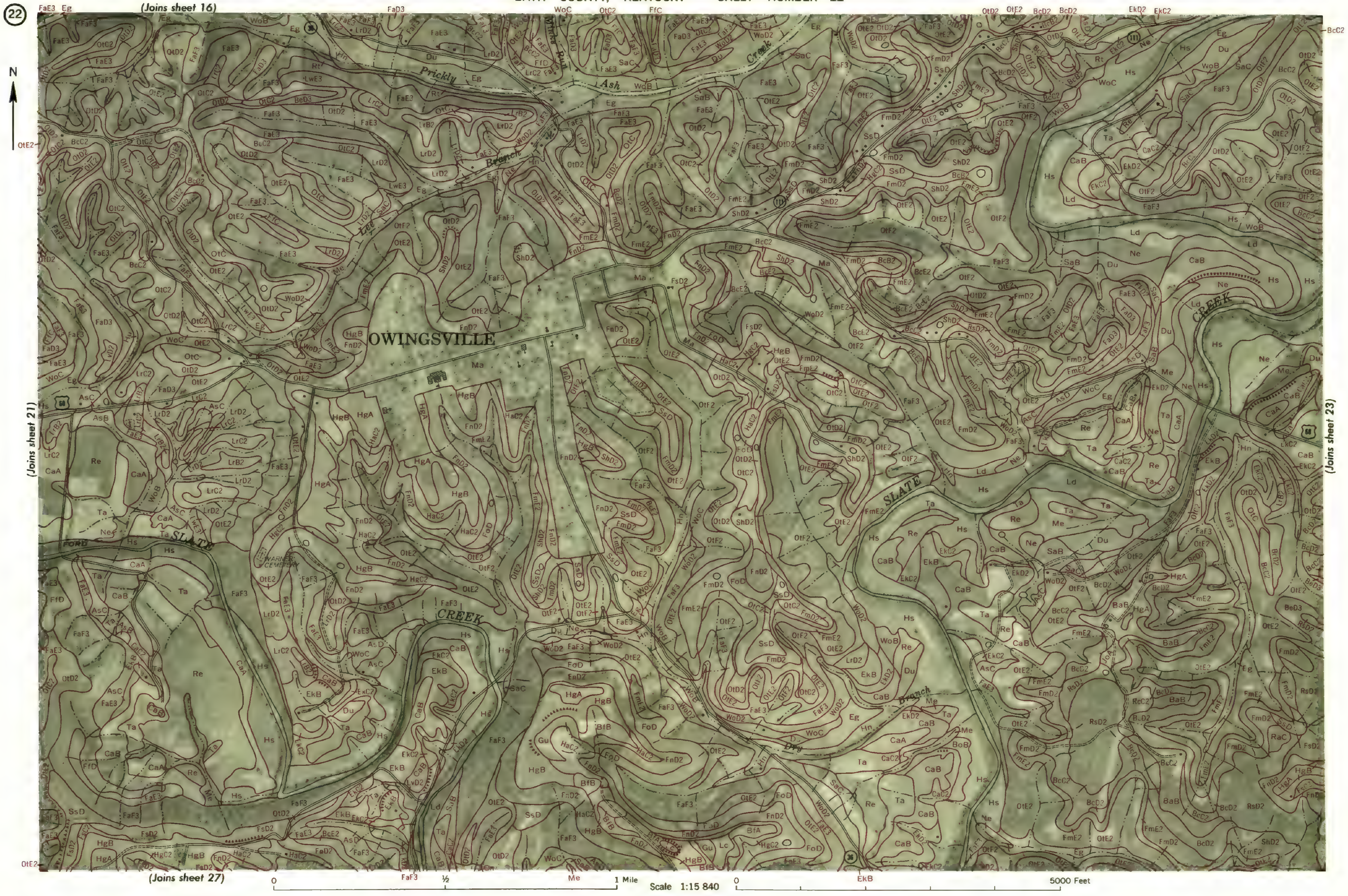
(Joins sheet 20)

(Joins sheet 22)

(Joins sheet 26)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

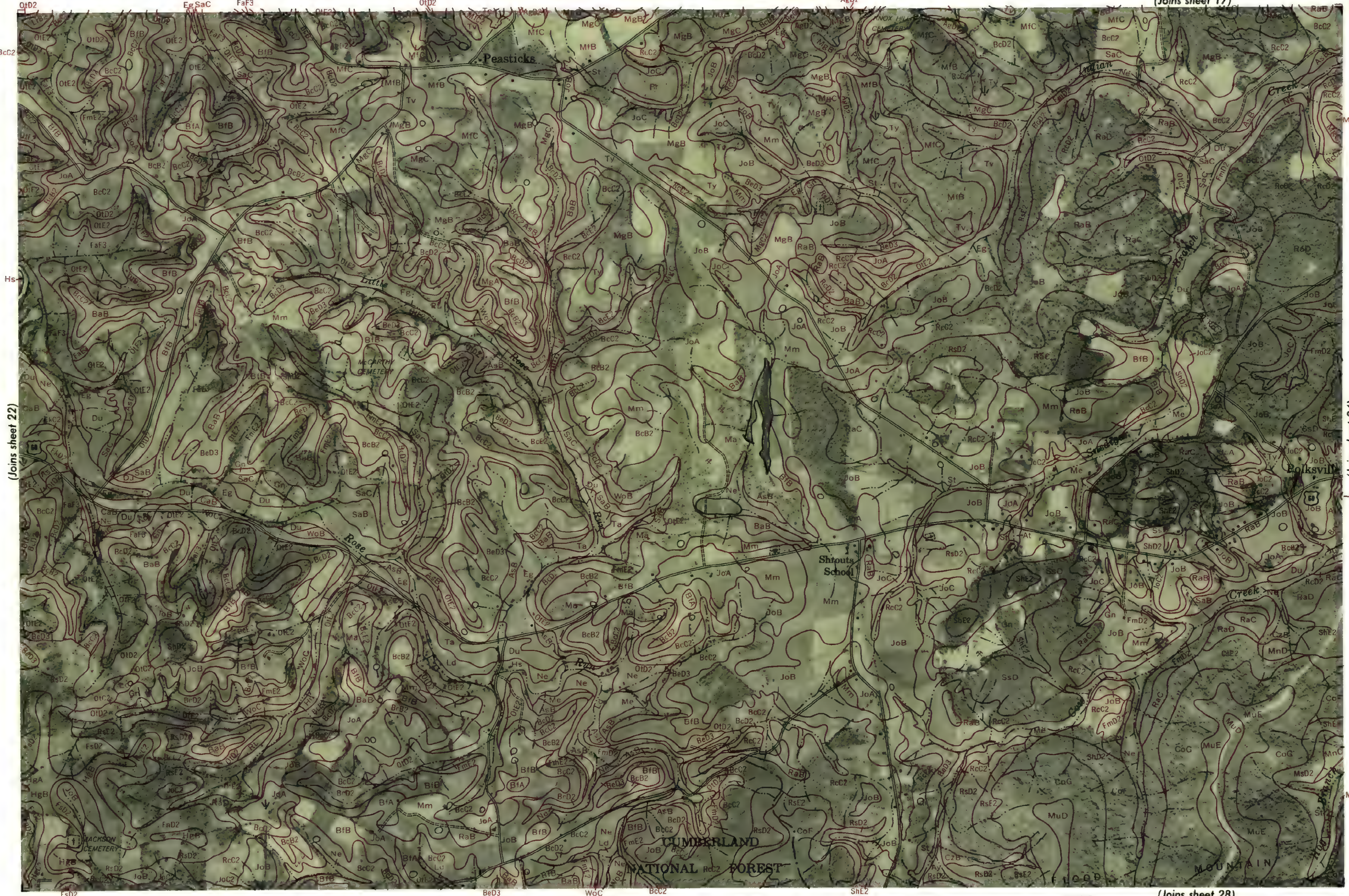
This map is one of a set compiled in 1962 as a part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Kentucky Agricultural Experiment Station.


22
(Joins sheet 16)
(Joins sheet 21)
(Joins sheet 23)
(Joins sheet 27)
N
OWINGSVILLE
Prickly
Ash
Creek
Branch
Lee
SLATE
CREEK
Dry
Branch
WARNER CEMETERY
FORD
Scale 1:15 840
0
½
1 Mile
5000 Feet

23

(Joins sheet 17)

(Joins sheet 22)



(Joins sheet 24)

(Joins sheet 28)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

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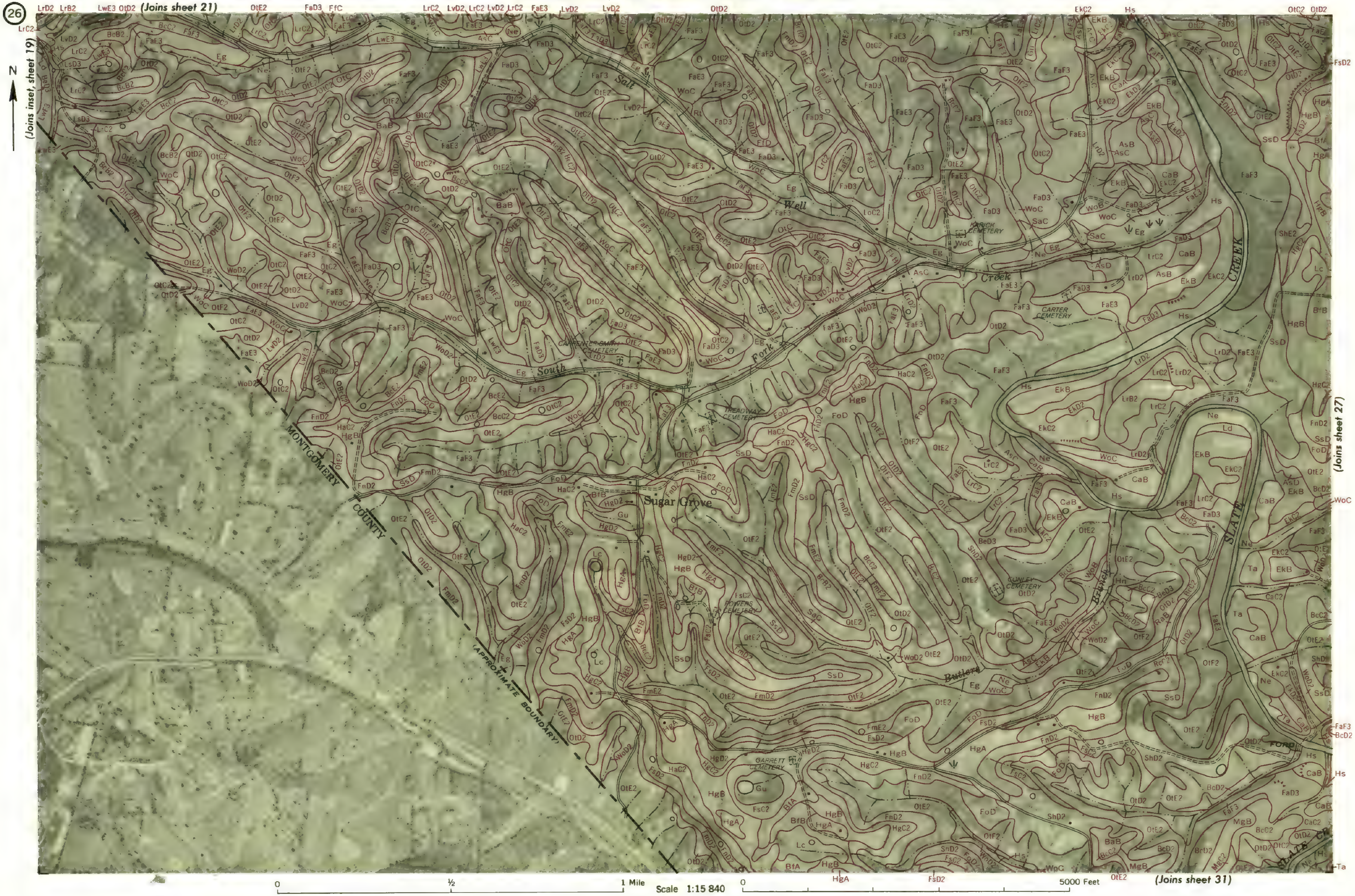
BATH COUNTY, KENTUCKY — SHEET NUMBER 24

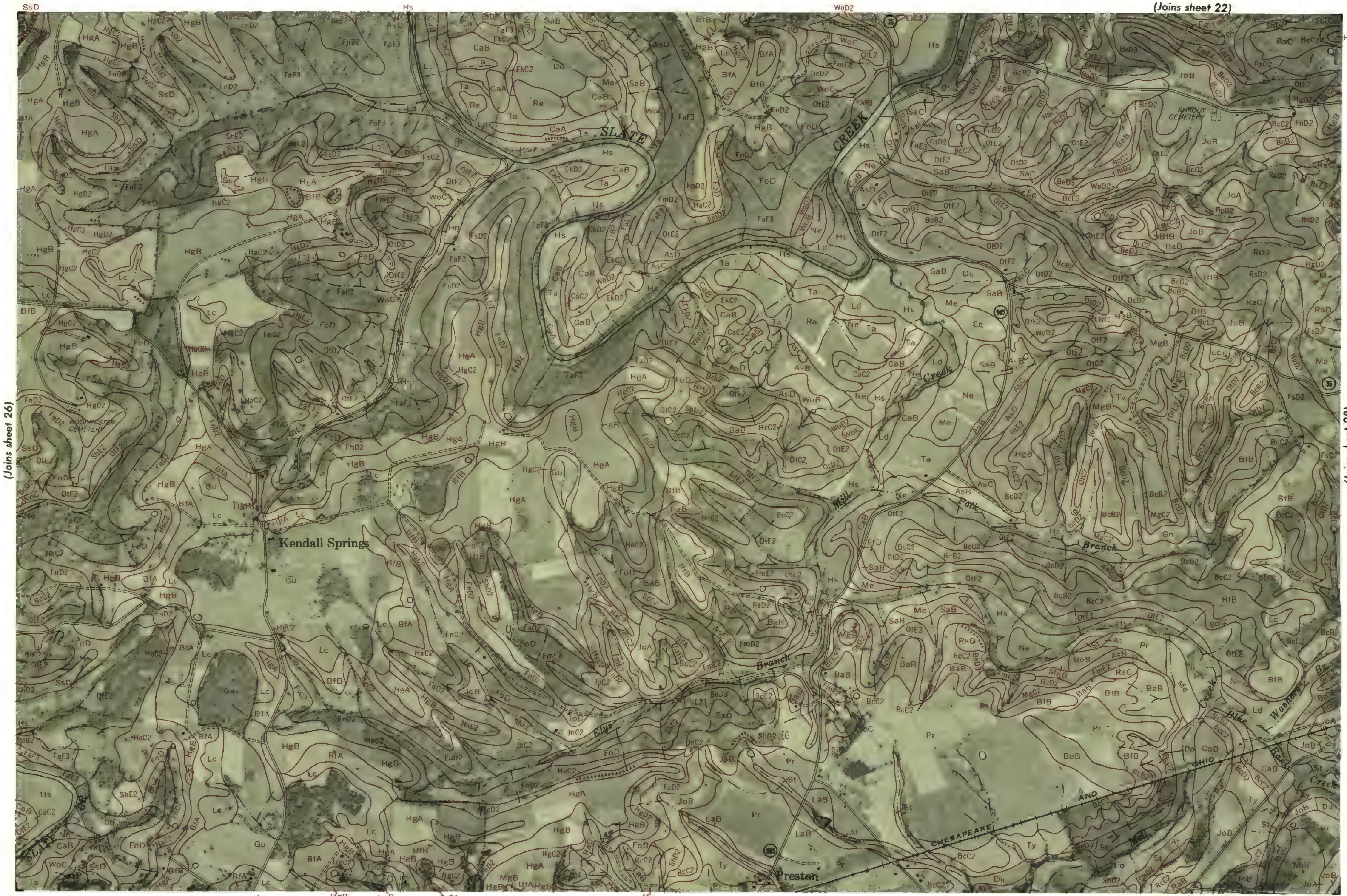
25

This map is one of a set compiled in 1962 as a part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Kentucky Agricultural Experiment Station.

BATH COUNTY, KENTUCKY — SHEET NUMBER 26

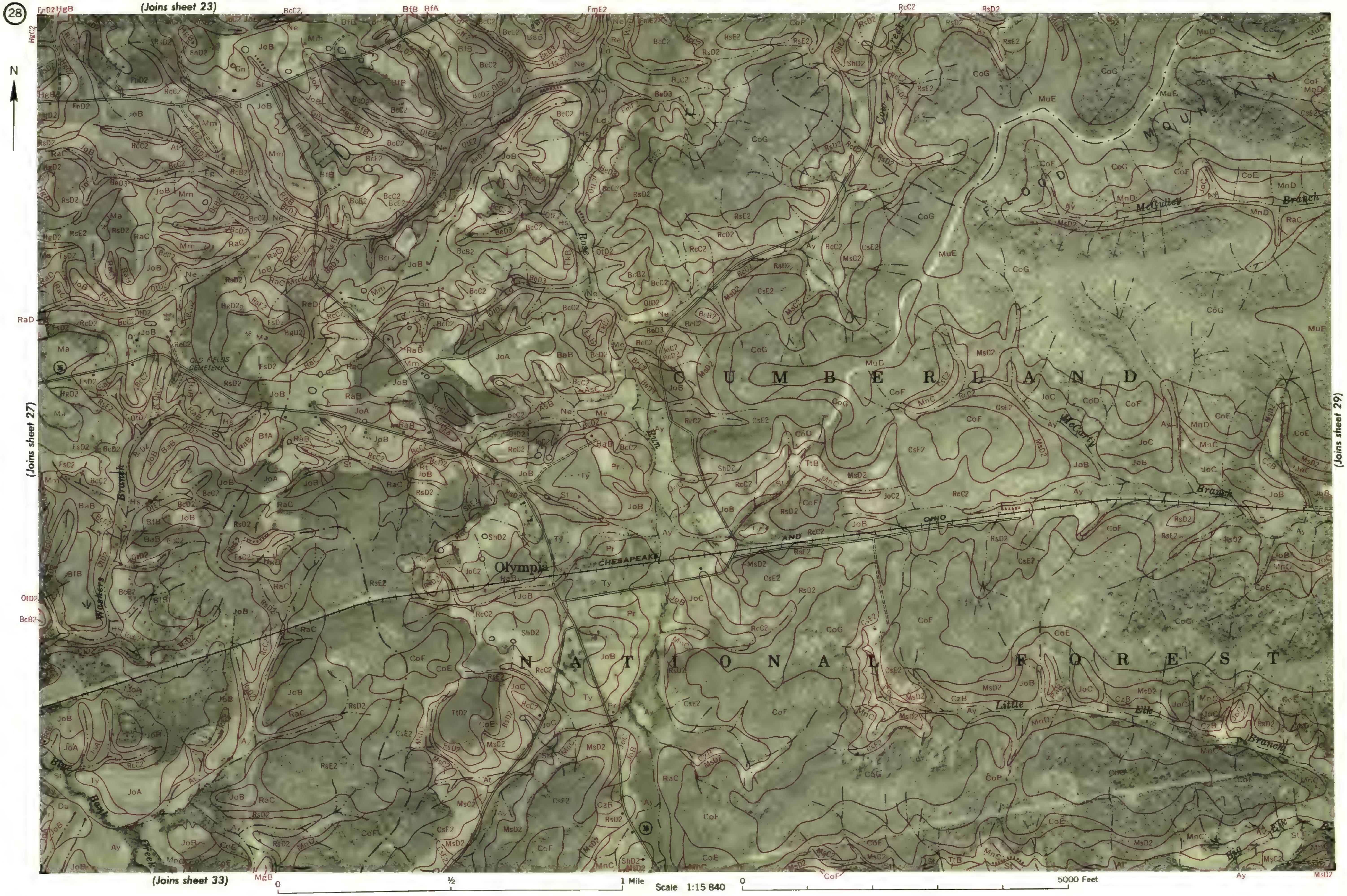


(Joins sheet 22)



(Joins sheet 32)

This map is one of a set compiled in 1962 as a part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Kentucky Agricultural Experiment Station.


28
N
(Joins sheet 23)
(Joins sheet 27)
(Joins sheet 29)
(Joins sheet 33)
CUMBERLAND NATIONAL FOREST
FLOOD MOUNTAIN
Olympia
CHESAPEAKE AND OHIO
McGulley Branch
McCarty Branch
Little Elk
Branch
Washers Branch
Blue Bank Creek
Rose Run
Cow Creek
OLD FIELDS CEMETERY
Scale 1:15 840
0
½
1 Mile
0
5000 Feet

29

(Joins sheet 24)

(Joins sheet 28)

(Joins sheet 30)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

(Joins sheet 34)

This map is one of a set compiled in 1962 as a part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Kentucky Agricultural Experiment Station.

This map is one of a set compiled in 1962 as a part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Kentucky Agricultural Experiment Station

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

30

(Joins sheet 25)

N

(Joins sheet 29)

(Joins sheet 35)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

This map is one of a set compiled in 1962 as a part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Kentucky Agricultural Experiment Station

(32)

(Joins sheet 27)

N

(Joins sheet 31)

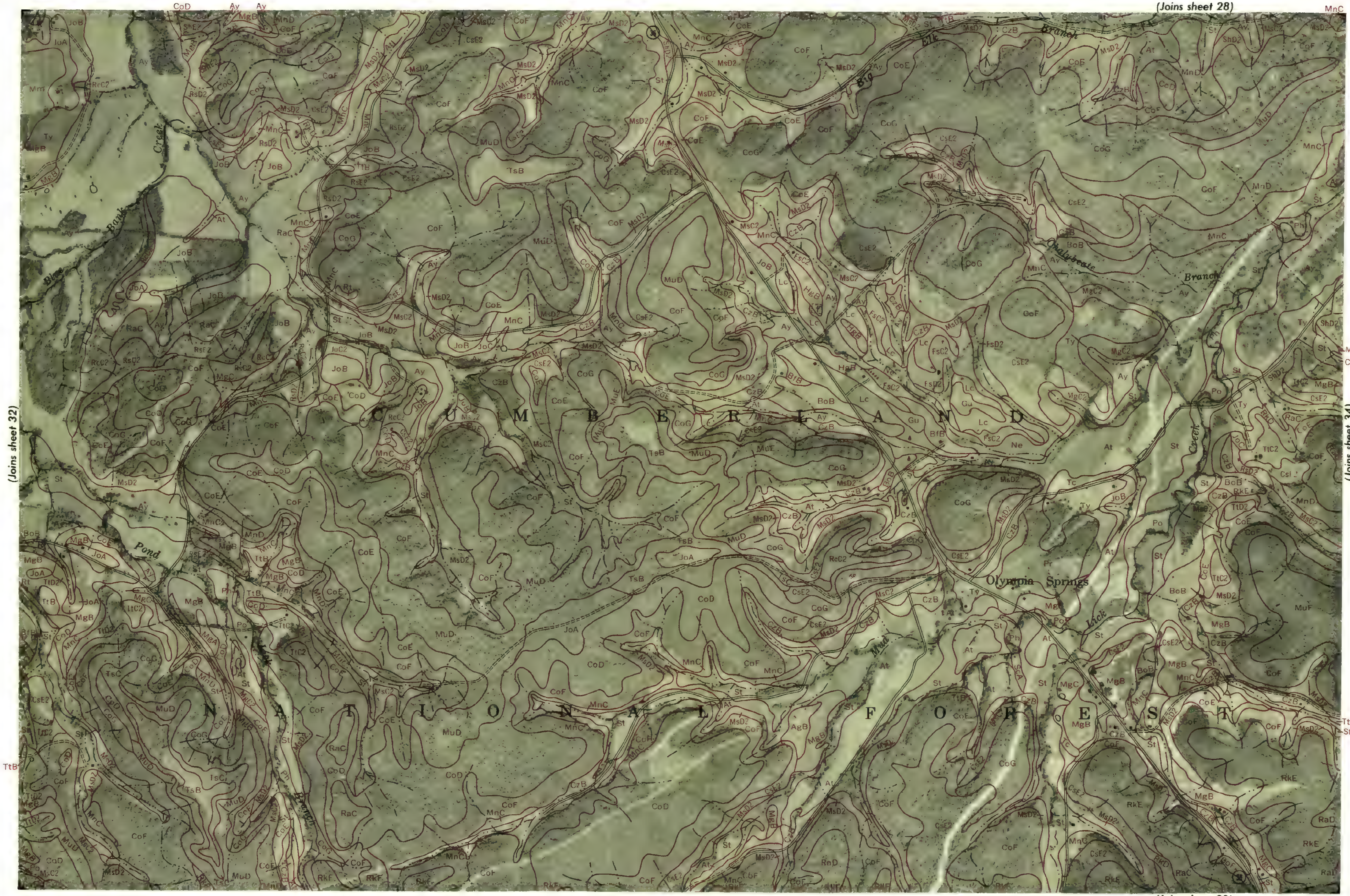
(Joins sheet 33)

(Joins sheet 37)

0 ½ 1 Mile

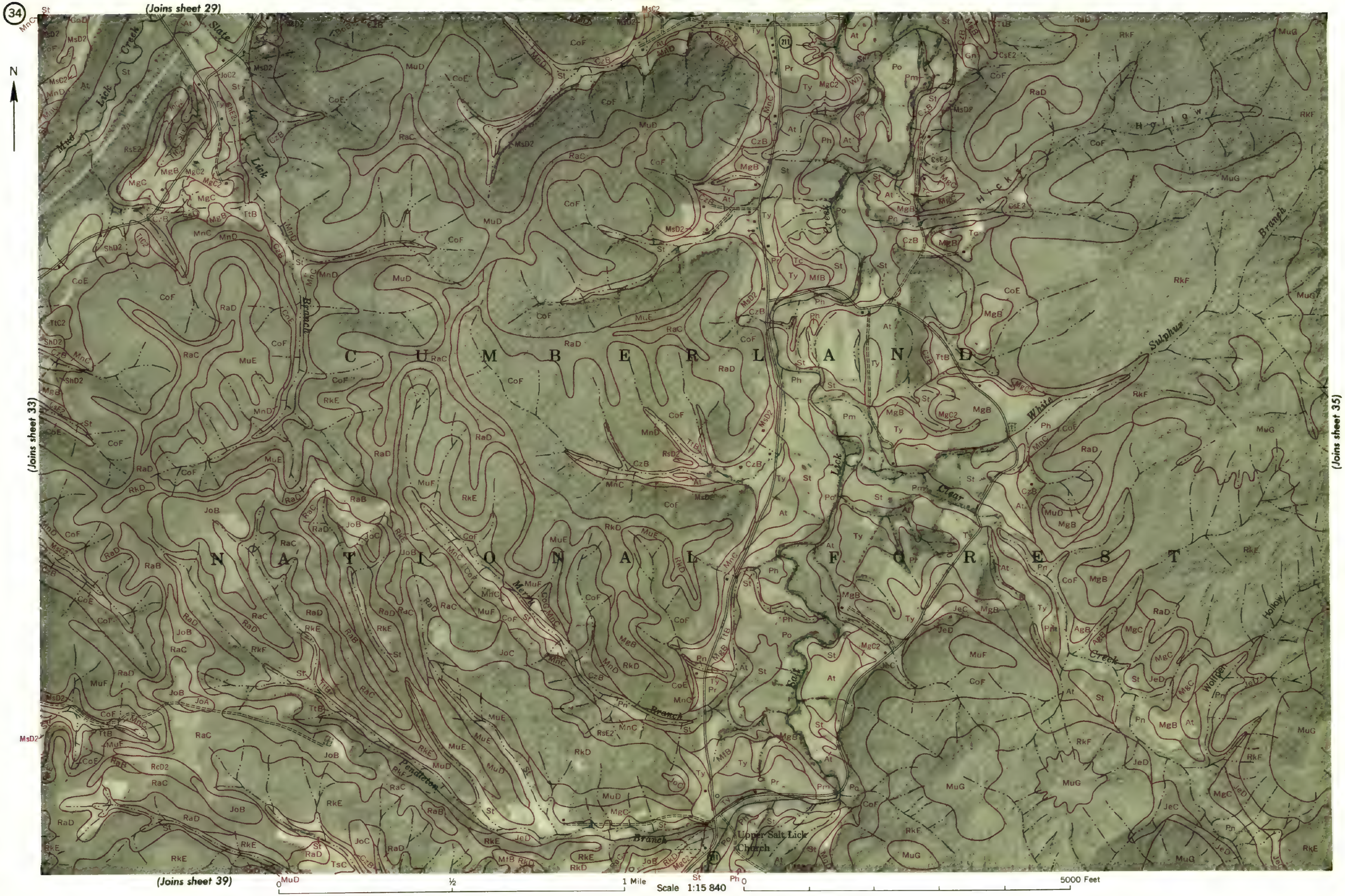
Scale 1:15 840

0 5000 Feet



This map is one of a set compiled in 1962 as a part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Kentucky Agricultural Experiment Station.

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet


34
(Joins sheet 29)
N
(Joins sheet 33)
(Joins sheet 35)
(Joins sheet 39)
C U M B E R L A N D
N A T I O N A L F O R E S T
Mud Lick Creek
Slate Lick
Branch
Hicks Hollow
Sulphur Branch
White Creek
Clear Creek
Salt Lick Creek
Wolfpen Hollow
Pendleton Branch
Upper Salt Lick Church
0 ½ 1 Mile
Scale 1:15 840
0 5000 Feet

(Joins sheet 30)

(Joins sheet 34)

(Joins sheet 36)

(inset, sheet 36)

(Joins sheet 40)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

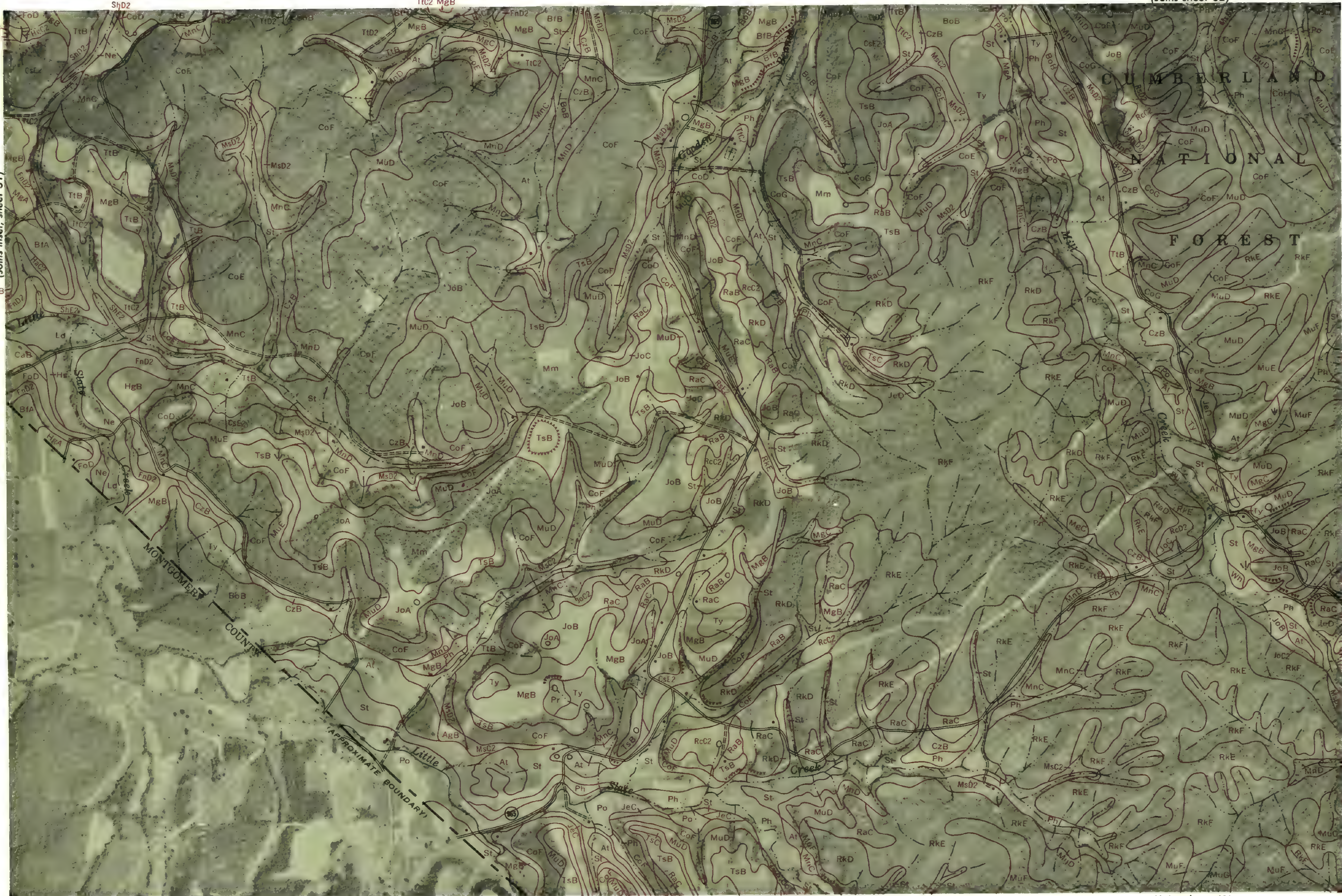
This map is one of a set compiled in 1962 as a part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Kentucky Agricultural Experiment Station.

36

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

(Joins sheet 32)

(Joins inset, sheet 31)



(Joins sheet 38)

(Joins sheet 41)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

This map is one of a set compiled in 1962 as a part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Kentucky Agricultural Experiment Station.


38
(Joins sheet 33)
(Joins sheet 37)
(Joins sheet 39)
(Joins sheet 42)
N
North Knob
Center Knob
South Knob
BIG MOUNTAIN
CUMBERLAND NATIONAL FOREST
Pine Grove School
Mud Lick
Pond Lick
Broken Branch
Deer Lick Branch
Clark Fork
Mill Creek
MENIFEE COUNTY
0 ½ 1 Mile
Scale 1:15 840
0 5000 Feet

(Joins sheet 34)

(Joins sheet 38)

(Joins sheet 40)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

(Joins inset, sheet 40)

This map is one of a set compiled in 1962 as a part of a soil survey by the Soil Conservation Service, United States Department of Agriculture and the Kentucky Agricultural Experiment Station

4

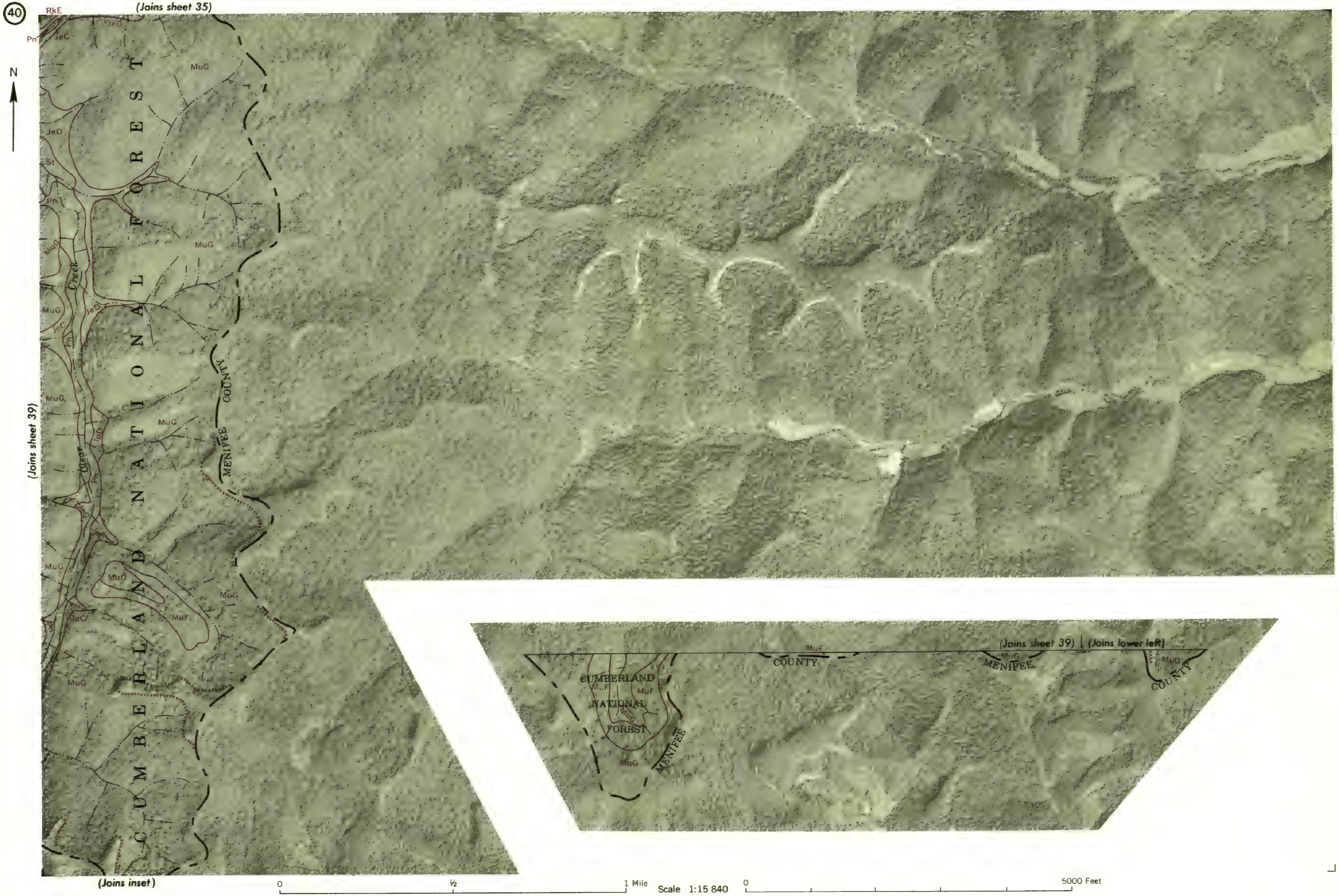
N

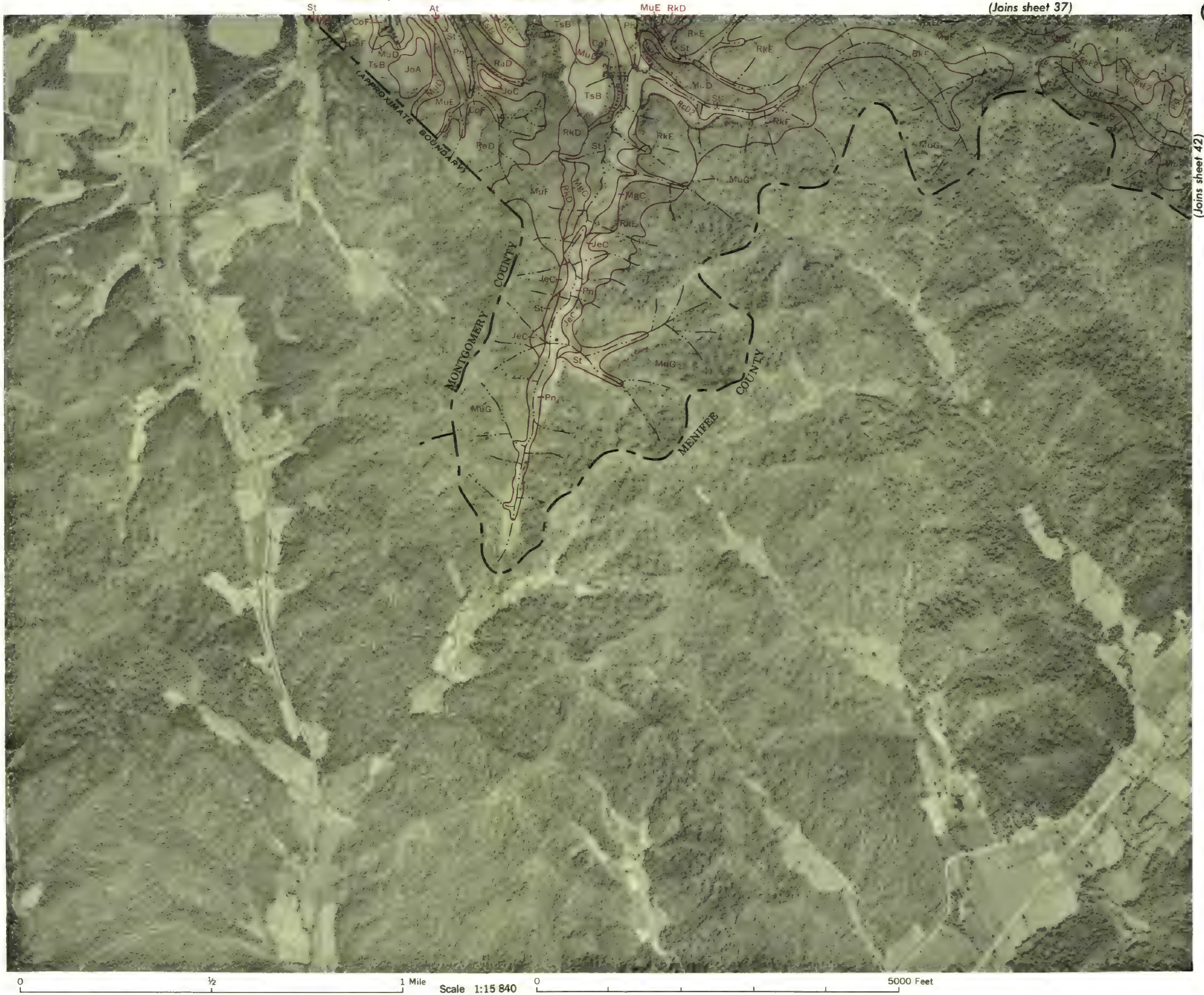
(Joins sheet 1)

(Joins sheet 5)

(Joins sheet 9)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet


40
N
(Joins sheet 35)
(Joins sheet 39)
(Joins inset)
CUMBERLAND NATIONAL FOREST
MENIFEE COUNTY
Clear Creek
RkE
JeD
JeC
Pn
St
MuG
MuD
MuF
(Joins sheet 39) | (Joins lower left)
0
½
1 Mile
Scale 1:15 840
0
5000 Feet



This map is one of a set compiled in 1962 as a part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Kentucky Agricultural Experiment Station.

42

(Joins sheet 38)

N

(Joins sheet 41)

0 ½ 1 Mile Scale 1:15 840 0 5000 Feet

BATH COUNTY, KENTUCKY — SHEET NUMBER 5

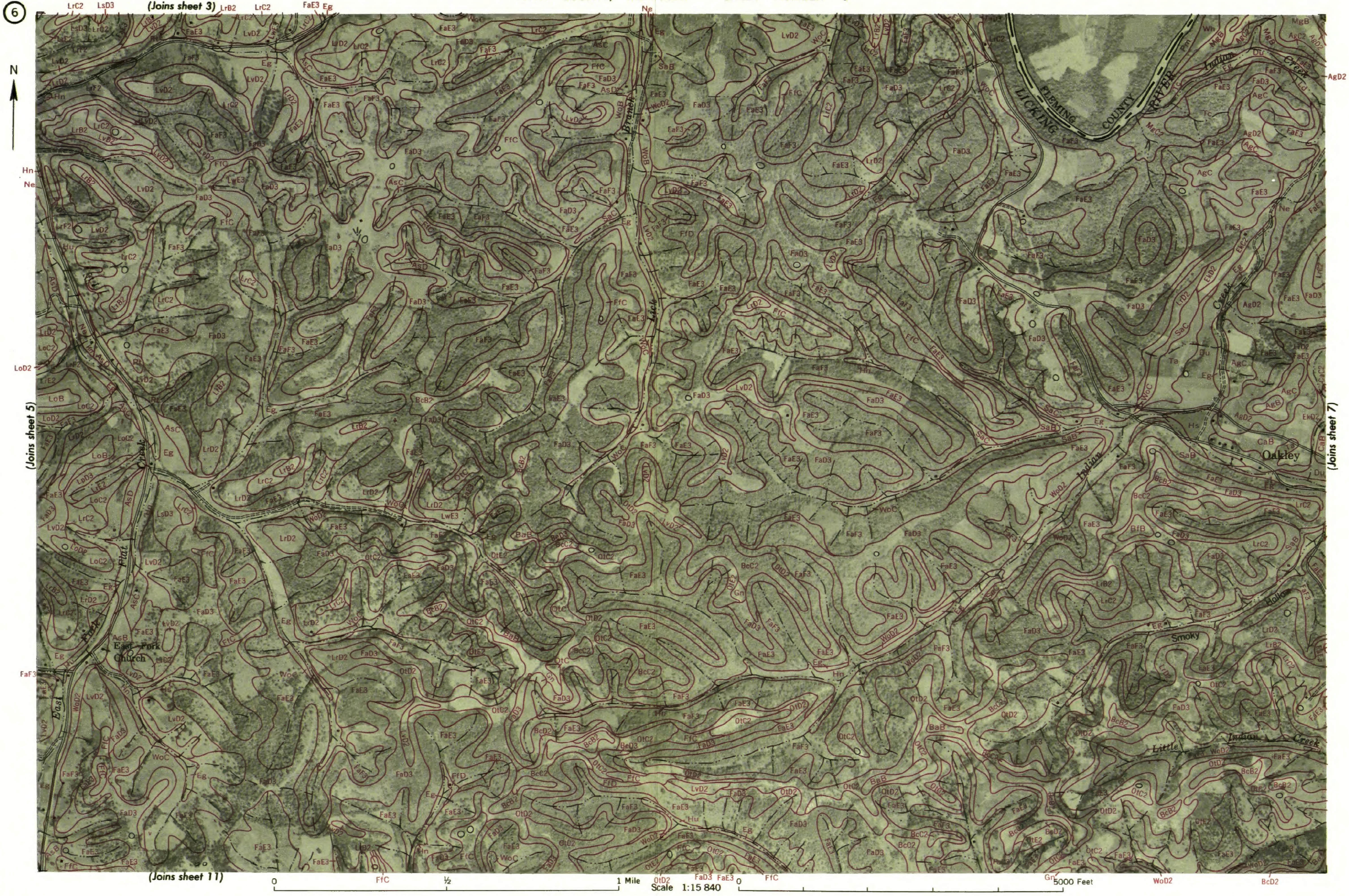
5

Scale 1:15 840

0 ½ 1 Mile

0 5000 Feet

The map is one of a set compiled in 1962 as a part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Kentucky Agricultural Experiment Station.


6
N
(Joins sheet 3)
(Joins sheet 5)
(Joins sheet 7)
(Joins sheet 11)
LICKING RIVER
FLEMING COUNTY
Indian Creek
Lick Branch
Flat Creek
East Fork
East Fork Church
Oakley
Smoky Hollow
Little Indian Creek
0
½
1 Mile
Scale 1:15 840
0
5000 Feet

0 ½ 1 Mile

Scale 1:15 840

0 5000 Feet

This map is one of a set compiled in 1962 as a part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Kentucky Agricultural Experiment Station.

8

N

0 ½ 1 Mile

Scale 1:15 840

0 5000 Feet

BATH COUNTY, KENTUCKY — SHEET NUMBER 9

This map is one of a set compiled in 1962 as a part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Kentucky Agricultural Experiment Station.